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TRW Environmental Engineering Div.
Redondo Beach, CA

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SAMPLING AND ANALYSIS
OF
POTENTIAL GEOTHERMAL SITES

by

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This document contains general information on the physical, chemical and radiochemical data of geothermal manifestations (wells and springs) in areas with the most probable potential for development. Information contained in this document, together with other existing data, can be used to evaluate control technologies and to ultimately establish emission/discharge standards for the emerging geothermal industry.

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FOREWORD

When energy and material resources are extracted, processed, converted, and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory-Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

The purpose of this sampling and analysis effort is to obtain general information on the physical, chemical and radiochemical characteristics of geothermal manifestations (wells and springs) in areas with the most probable potential for development. Information acquired through this program together with other existing data will be used to evaluate control technology needs for the emerging geothermal industry. For further information on this report, contact the Alternate Energy Sources Branch.

David G. Stephan
Director
Industrial Environmental Research Laboratory
Cincinnati, Ohio

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ABSTRACT

Substantial efforts are underway to conserve energy, substitute renewable resources for non-renewable ones, and develop domestic alternatives to imported fuels. These are part of a concerted approach to combat the unstable petroleum imports and the dwindling supply of natural gas. One of the resources that has received increasing attention and public interest in the United States is geothermal energy. Demonstration plants for extracting heat from geothermal fluids are emerging rapidly in many parts of the country. Improper handling of the geothermal fluids, however, can produce undesirable air emissions, contamination of surface and subsurface waters, and possibly, subsidence and seismic activities. The U. S. Environmental Protection Agency (EPA) is evaluating the pollution aspects of these operations. As an initial step, EPA produced a geothermal pollution control guidance document in anticipation of formal regulation. Thus far the basic geothermal fluid characterization data to support guidance development has been scarce.

As a first step an assessment of the existing data was performed. Information required for the evaluation of site and sampling/analysis methodologies should include: 1) geothermal potential and sampling accessibility/availability of each site; 2) previous sampling and analysis methodologies, and 3) validity and accuracy of historical data as well as data gaps. Sites selected for sampling were based on one or more of the following criteria: high temperature and/or flow, insufficient chemical data base, recommendations by federal or state agencies, and regional interest in fluid characterization. Sampling and analysis methodologies were evaluated to verify historical data and to determine requirements for designing sampling/analysis equipment and procedures relevant to the project.

Sampling apparatus was designed to collect aqueous and non-condensible gas samples from both geothermal wells and springs. Analysis methodologies for aqueous samples were developed for measurements of pH, conductivity, temperature, alkalinity, major cations and anions, silica, phosphates, sulfide, total dissolved and suspended solids, and trace metals. Non-condensible gases were analyzed for H_2S, CO, CO_2, O_2, NH_3, CH_4 and radon. For maintaining the integrity of the geothermal sample, some analyses were performed in the field. The more stable constituents were preserved and air shipped to the main laboratory for chemical and radioactivity analyses.

A total of 121 sites consisting of 6 wells and 115 springs were sampled. Gas samples were obtained at 25 sites and algae samples were obtained at 72 sites. Under this program a comprehensive data base, consisting of 40 analytical parameters was developed for each of the sites. These data were

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tabulated for each along with historical data for comparison. The geochemical data varied widely for each state, and there was little correlation of the data within or among states. For most of the states sampled, the quality of geothermal fluids varies from potable water to worse than brackish water. This study confirms that most geothermal waters are considerably less saline than sea water. The median pH values of most geothermal fluids lie between 7.4 and 8.0. In terms of water quality, Idaho and Montana appear to be the best, with constituent concentrations approximating those of surface water supplies. The correlation with historical data was quite good. Only a few non-directional deviations (>50%) were observed, due primarily to hydrologic changes, sampling site differences or analytical variations. Trace elements were generally not comparable. Radioactivity analyses have not shown levels which are currently of concern.

The most abundant species of trace elements found in algae are Fe, Al, Ca, Na, K and Mg with concentrations greater than thousands of milligrams per kilogram of algae (ppm). Trace elements that were found to be absent from algae are Cs, Se, Sb, Hg, Ti, Tl, Rb and Mo. Other trace elements were found to be absent from algae are Cs, Se, Sb, Hg, Ti, Tl, Rb and Mo. Other trace elements were found in varying concentrations, ranging from less than 1 ppm to over 1000 ppm. There does not appear to be any pattern in algae concentration of metals for a given state.

This report was submitted in fulfillment of Contract No. 68-03-2560 by the TRW Environmental Engineering Division under the sponsorship of the U. S. Environmental Protection Agency. This report covers the period April 1978 to April 1979. Work was completed on this project in October 1980.

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SECTION 1

INTRODUCTION

One of the resources that has received increasing scientific attention and public interest in the United States is geothermal energy. The development of geothermal conversion technology is progressing rapidly. Demonstration plants are being designed and constructed. The extraction of heat from geothermal fluids can result in undesirable air emissions, contamination of surface and subsurface waters, noise pollution, and possibly, subsidence and seismic activities.

The principal objective of this grab sampling program is to obtain general information on the physical, chemical and radiochemical characteristics of the geothermal manifestations (wells and springs) in areas with the most probable potential for development. The intent of this study is not to characterize each geothermal reservoir in detail, but rather to establish an initial general knowledge of the overall geothermal resource base in the western United States. Information acquired together with other existing data will be used to evaluate control technologies for the emerging geothermal industry.

The sampling program consisted of six major tasks: 1) existing data assessment and site selection; 2) field sampling, safety and OA/OC control; 3) lab coordination and analysis; 4) sampling/analysis scheduling and report preparation; 5) sampling manual preparation; and 6) data management and reporting.

SECTION 2

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- Geochemical data have been compiled for 121 geothermal sites with over forty chemical and physical parameters analyzed per site.
- Sampling data correlates well with historical data for most major constituents. Minor constituents such as trace metals are randomly distributed; there is no direct correlation with historical data.
- Analyses of algae samples from 72 geothermal springs indicated that the predominant parameters are Fe, Al, Ca, Na, K, and Mg with concentrations exceeding 1000 ppm by weight. Metals that were not detected include Cs, Se, Sb, Hg, Ti, Tl, Rb, and Mo. Other trace elements have varying concentrations, ranging from less than 1 ppm to over 100 ppm.

RECOMMENDATIONS

- Approximately 5000 pieces of data have been generated from this sampling effort. These data, as well as those contained in the literature, have not been thoroughly evaluated relevant to regional correlation of geochemical data. Additional effort, including a comprehensive statistical evaluation of the data base, is needed to substantiate or disprove regional correlations of data. Such correlations will be useful in predicting resource characteristics based on limited analytical information.

SECTION 3

SAMPLING AND ANALYSIS PROCEDURES

TEST PLAN EXECUTION

Rationale for the Selection of Sampling Sites

There are approximately 1200 thermal springs (with temperatures of at least 15°F above ambient air temperature) in the conterminous United States, with about 95 percent of them in the western part of the country. The evaluation and selection of geothermal sampling sites for this program concentrated on the western resources. Two hundred and twenty-five potential geothermal sites (liquid dominated resources) were surveyed and identified; and subsequently 170 wells and springs were prioritized on the basis of available geophysical characteristics (resource type, flow, temperature, well depth, use and accessibility, sampling interface etc.) and geochemical data (cations, anions, gross parameters, radioactivity etc.). Originally the sampling program was to collect and analyze geothermal fluid samples from approximately 16 wells and 114 hot springs located in eleven western states. During the initial site selection effort, an attempt was made through a meeting with the geothermal committee of the Western Oil and Gas Association, to gain access to company owned wells. Access was denied and the EPA project was redirected to concentrate on spring sampling and to collect samples only on government sites or from interested private concerns. A revised list of 121 sampling sites was ultimately selected. Table 1 summarizes by state, all of the geothermal sites actually sampled. A map illustrating the approximate locations of the geothermal sites sampled is depicted in Figure 1.

Data Assessment

In conformance with the work directive, the first task was the evaluation of existing data for identified geothermal sites. To this end, all available physical, chemical and radiological data were compiled and evaluated. Information sources included: 1) the Environmental Protection Agency, EMSL at Las Vegas; 2) the brine data file at Lawrence Berkeley Laboratory of U.C. Berkeley; 3) U.S. Geological Survey at Menlo Park, California; 4) the Department of Energy, geothermal field office in San Francisco; 5) state mineral or geologic survey agencies; and 6) government contractors, such as Battelle Pacific Northwest Laboratory (PNL) and the University of Southern California. Data for the 121 sampling sites were reviewed, information gaps and sampling and analysis methodologies were identified, and the adequacy of the data base was evaluated. The following is a brief summary of the data assessment effort.

The data were separated into two major categories. The first category, comprised of geophysical and location data, was assessed to determine the geothermal potential and the actual sampling accessibility/availability of each

TABLE 1. CHRONOLOGICAL LIST OF GEOTHERMAL SPRINGS/WELLS SAMPLED

Site No.	Site Name	State	Spring or well	Type of Samples Collected Liquid	Gas	Algae	Reason for Sampling
25	East Mesa-Bu. of Rec.	CA	W	X			a,b,c
153	Warner H.S.	CA	S	X	X	X	a,b,c
254	Magma-East Mesa	CA	W	X	X	X	a,b,c
8	Aqua Caliente	AZ	W	X			c,d
140	Verde H.S.	AZ	S	X		X	c,d
5	Mt. Graham H.S.	AZ	S	X		X	d,e
7	Gillard H.S.	AZ	S	X		X	a,f
2	Indian H.S.	AZ	S	X		X	b,c
91	Lower Frisco H.S.	NM	S	X			a,c
94	Gila H.S.	NM	S	X		X	a,b,c
93	Faywood H.S.	NM	S	X		X	c,f
92	Radium H.S.	NM	S	X			d,f
251	Yucca Bath and Lodge	NM	S	X		X	c,d,e
100	Jemez H.S.	NM	S	X			a,b
101	Soda Dam Springs	NM	S	X			b,d
97	Ojo Caliente (Iron Springs)	NM	S	X			d
55	Wagon Wheel	CO	S	X	X	X	d,f
60	Mineral H.S.	CO	S	X		X	a,f
54	Waunita H.S.	CO	S	X		X	a,b
47	Poncha H.S.	CO	S	X			a,b
45	Cottwood H.S.	CO	S	X		X	b,c
176	Idaho H.S.	CO	S	X		X	c,f

LEGEND:
a. High reservoir and/or surface temperature or no data.
b. High flow.
c. Easy access and/or extensive use.
d. Little information on prior chemical analyses or data need updating.
e. Recommendations of federal and/or state agencies.
f. Specific interest in regional chemical characterization.

Table 1. (Continued)

Site No.	Site Name	State	Spring or well	Type of Samples Collected Liquid	Gas	Algae	Reason for Sampling
176	Idaho H.S.	CO	S	X		X	c,f
53	Sulfur H.S.	CO	S	X		X	c,f
57	Routt H.S.	CO	S	X		X	b,c
58	Steamboat Springs	CO	S	X	X	X	b,c
52	Glenwood (Big Springs)	CO	S	X	X	X	a,b
134	Pah Tempe (La Verkin) H.S.	UT	S	X	X	X	b,c,d
122	Thermo H.S.	UT	S	X		X	a,b,c
178	Joseph H.S.	UT	S	X		X	a,c
131	Red Hill H.S.	UT	S	X	X	X	a,d
130	Monroe H.S. (Cooper)	UT	S	X	X		a,b,c
127	Baker's H.S.	UT	S	X		X	b,c
132	Saratoga H.S.	UT	S	X		X	b,d
133	Midway H.S.	UT	S	X		X	c,f
125	Utah H.S. (Bear River)	UT	S	X		X	b,c
123	Crystal H.S. (Masden's)	UT	S	X		X	c,f
136	Ogden H.S.	UT	S	X		X	c,f
129	Wasatch H.S.	UT	S	X		X	b,c,f
124	Stinking H.S.	UT	S	X		X	a,c,f
72	Hot Sulfur Springs	NV	S	X			a,b,c
243	Sulfur H.S. (Ruby Valley)	NV	S	X			a,e,f
90	Monte Neva (Melvin, H.S.)	NV	S	X			b,d
247	Lockes H.S.	NV	S	X			d,e
233	Darrough	NV	S	X		X	a,e
265	Buffalo Valley	NV	S	X		X	c,d
75	Beowawe	NV	S	X			a,c,d
73	Hot Hole	NV	S	X		X	c,d
77	Golconda	NV	S	X	X	X	a,e
84	Lawton	NV	S	X			d
88	Steamboat	NV	S	X	X		a,e,f
256w	Bower's Mansion (Well)	NV	W	X			d,f

Table 1. (Continued)

Site No.	Site Name	State	Spring or well	Type of Samples Collected Liquid	Gas	Algae	Reason for Sampling
256s	Bower's Mansion (Spring)	NV	S	X		X	d,f
71	Walley's H.S. (Genoa)	NV	S			X	a,b
83	Great Boiling (Gerlach) H.S.	NV	S	X	X		b,d
257	Trego H.S.	NV	S	X		X	a,d
238	Double H.S.	NV	S	X		X	b,e
174	Wards H.S. (Fly Ranch)	NV	S	X		X	e,f
237	Dixie H.S.	NV	S	X		X	a,d,f
239	Sou H.S. (Seven Devil)	NV	S	X		X	a.d
78	Wabuska H.S.	NV	S	X			a,f
79	Leach H.S.	NV	S	X		X	a,d,f
217	Lee H.S.	NV	S	X			a,d,f
248w	Needle Rocks (Well)	NV	W	X		X	b,e,f
248s	Needle Rocks (Spring)	NV	S	X		X	b,e,f
241	Moana H.S.	NV	S	X		X	d
210	Kyle H.S.	NV	S	X	X	X	a,f
186w	Baltazor (Well)	NV	W	X		X	a,d,f
186s	Baltazor (Spring)	NV	S	X	X	X	a,d,f
185	Hot Lake	OR	S	X			b,d,f
184	Alvord H.S.	OR	S	X			a,b,d
180	Mickey H.S.	OR	S	X	X	X	a,d
182	Vale H.S.	OR	S	X		X	a,d,f
226	Roystone H.S.	ID	S	X		X	d
164	Weiser	ID	S	X			d
163	Crane Creek	ID	S	X			d
230	White Licks H.S.	ID	S	X	X	X	a,d,f
167	Starkey H.S.	ID	S	X		X	d,f
169	Riggins H.S.	ID	X	X			d
171	N.E. Boise Thermal Area	ID	S	X		X	a,e,f
170	Vulcan H.S.	ID	S	X			a,b,d
221	Boiling Springs	ID	S	X			a,b,d,f
225	Neinmeyer H.S.	ID	S	X			

Table 1. (Continued)

Site No.	Site Name	State	Spring or well	Type of Samples Collected liquid	Gas	Algae	Reason for Sampling
228	Bonneville H.S.	ID	S	X			a,b,d
64	Sunbeam H.S.	ID	S	X			a,b,d
229	Wardrop H.S.	ID	S	X			a,b,d
61	Condie H.S.	ID	S	X	X	X	b,d
162	Bruneau Grandview		S	X		X	e
220	Murphy H.S.	ID	S	X		X	d,f
63	Raft River Valley Project	ID	S	X	X		a,b,e,f
223	Maple Grove H.S.	ID	S	X		X	a,b,d
165	Squaw H.S.	ID	S	X	X	X	a,d
199	Auburn H.S.	WY	S	X	X	X	d,f
252	Thermopolis H.S.	WY	S	X	X	X	d,f
198	Huckleberry H.S.	WY	S	X		X	a,d,f
250	Thaxton H.S.	MT	S	X			d,f
207	Norris, H.S. (Beartrap)	MT	S	X			a,b,d
206	Barkel's Silver Star H.S.	MT	S	X		X	a,b,f
208	Jardine H.S. (Jackson)	MT	S	X	X	X	b,d,f
204	Gregson H.S. (Fairmont)	MT	S	X			a,b,f
203	Boulder H.S.	MT	S	X			a,f
191	Baker H.S.	WA	S	X			f
196	Olympic H.S.	WA	S	X	X	X	d,f
194	Ohanapecosh H.S.	WA	S	X		X	d,f
138	Breitenbush H.S.	OR	S	X			a,b,d
191	Klamath Falls	OR	S	X			d
183	Crump's Spring	OR	S	X			a,f
120	Hunter's Lodge (Lakeview)	OR	S	S			a,b,d
121	Barry's Ranch	OR	S	X		X	a,b,d
36	Kelley H.S.	CA	S	X			a,b,f
39	Leonards H.S.	CA	S	X		X	b,f
40	Surprise Valley	CA	S	X		X	a,b,e
253	Amadee H.S.	CA	S	X	X		a,b

Table 1. (Continued)

Site No.	Site Name	State	Spring or well	Type of Samples Collected Liquid	Gas	Algae	Reason for Sampling
32	Wendel H.S.	CA	S	X		X	a,b,f
213	Susanville	CA	S	X			d,e,f
145	Morgan H.S.	CA	S	X		X	d
148	Skaggs H.S.	CA	S	X	X	X	d
147	Calistoga H.S.	CA	S	X			a,d
41	Fales H.S.	CA	S	X	X	X	b,f
143	Casa Diablo (Long Valley)	CA	S	S		X	a,b,f
149	Red's Meadow H.S.	CA	S	X			e,f
142	Coso H.S.	CA	S	X			a,e,f

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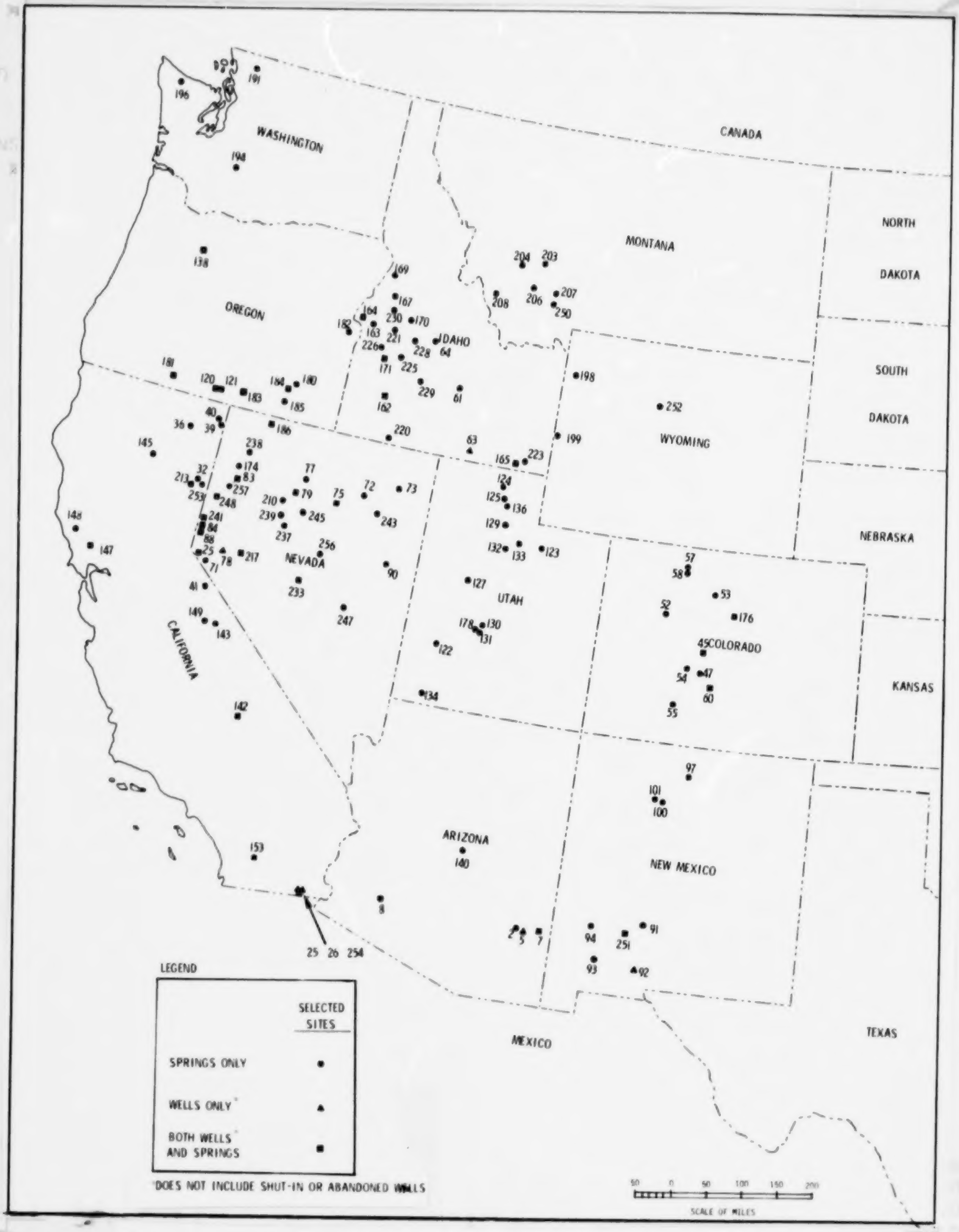
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Figure 1. Geographic locations of geothermal sites sampled.

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site. The second category, consisting of existing geochemical data, was evaluated to identify all data gaps, to determine the accuracy and validity of these data and to assess the methodologies utilized for sampling and analysis. The potential geothermal sites (based on their geophysical and locational data) were grouped according to state and were evaluated with regard to the adequacy of their geochemical data base. Data for each site were classified either as excellent, adequate, insufficient or no data. This classification was first applied to each category and was subsequently combined to yield a single assessment value of the data for a given site.

Sampling Methodology

Two basic sampling approaches, one for well sampling and one for spring sampling, were utilized in the field for this program. Well sampling is more elaborate than spring sampling because of the higher temperature and pressure of the geothermal fluids at the well head. Figures 2 and 3 are schematic representations of the equipment designed for geothermal well and spring sampling, respectively.

In general, for well sampling, the pressurized fluid from the well was collected either from a sample port or from the side of a silencer connected by a stainless steel coupling. The geothermal fluid was diverted from the well head through a 1/4-inch steel flexihose into a steam-water tangential separator. The liquid (brine) from the separator flowed by gravity into a stainless steel collection flask through a 1/4-inch stainless steel tubing chilled in an ice bath. The steam emanating from the separator then proceeded through an ice bath into a condensate trap via a 1/8-inch stainless steel tubing. The condensate was composited with the brine solution while the non-condensed gases from the condensate trap flowed into a gas collection flask. The above equipment was mounted in wooden boxes for breakage prevention and ease of transportation. Figure 4 is a photograph of the well sampling equipment.

For spring sampling, an inverted funnel, connected to an evacuated flask, was used to collect the non-condensible gases (Figure 5). The equipment is a modification of the standard U.S. Geological Survey equipment for spring sampling. In order to obtain a liquid sample from the spring, the sample was manually collected with a 3-gallon stainless steel container immersed directly under the water surface at or near the mouth of the spring. This procedure deviates from the original spring water sampling procedure which proposed the use of a suction pump to draw water from the spring. The pump to collect geothermal spring water was abandoned after several failures presumably due to clogging of the impeller by salt. The step-by-step procedures for both spring and well sampling as well as for radon sampling are included in Appendices A, B and C.

Sample Processing

Collected geothermal samples from either springs or wells were brought back to the van for processing and field analysis. Samples were preserved as described below and in Table 2 for analyses at the contractor's main laboratory.

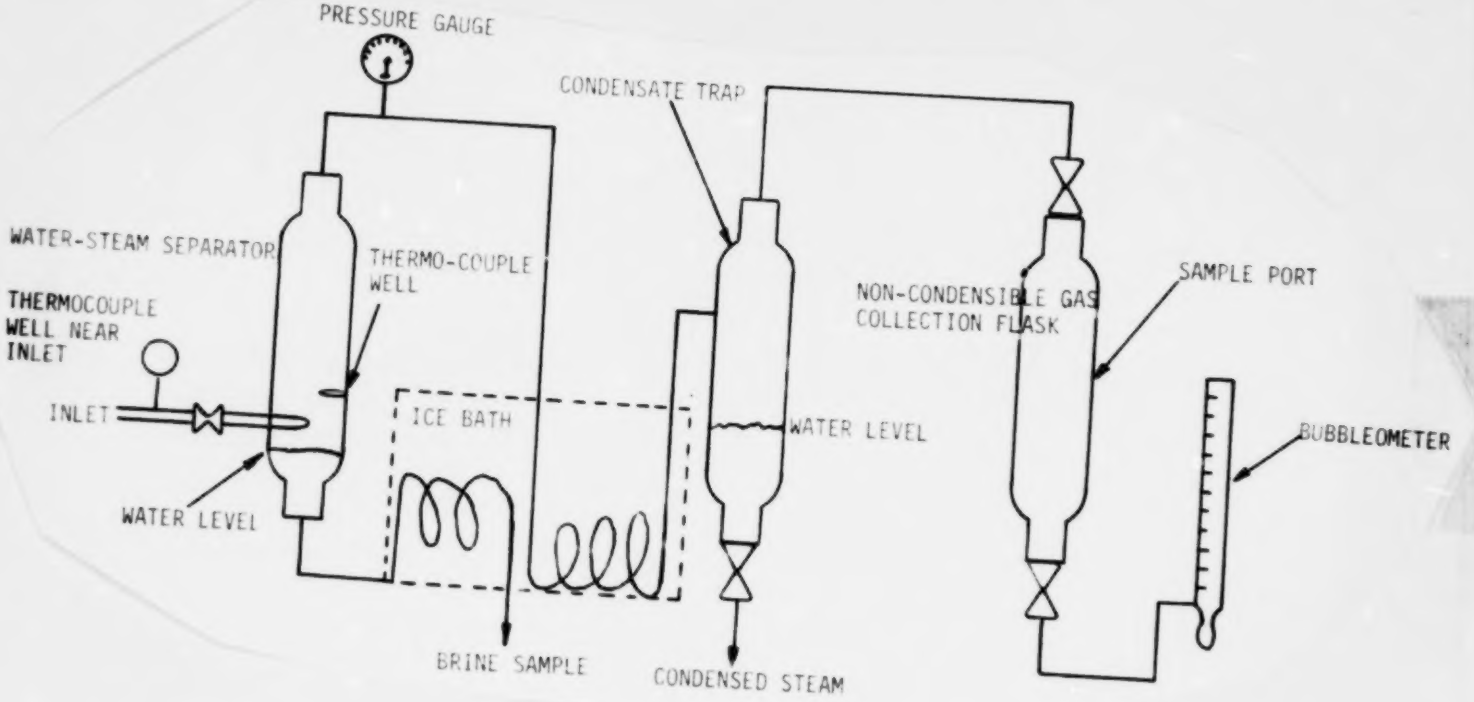
PRESSURE GAUGE
CONDENSATE TRAP
WATER-STEAM SEPARATOR
THERMO-COUPLE WELL
THERMOCOUPLE WELL NEAR INLET
INLET
WATER LEVEL
ICE BATH
BRINE SAMPLE
CONDENSED STEAM
WATER LEVEL
NON-CONDENSIBLE GAS COLLECTION FLASK
SAMPLE PORT
BUBBLEOMETER

Figure 2. Schematic diagram of the well sampling system.

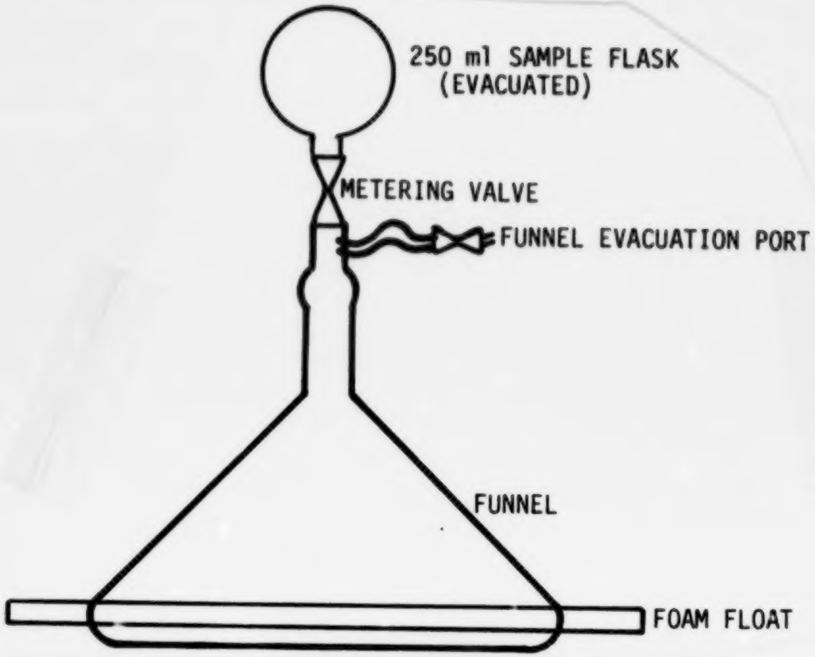
250 ml SAMPLE FLASK
(EVACUATED)
METERING VALVE
FUNNEL EVACUATION PORT
FUNNEL
FOAM FLOAT

Figure 3. Schematic diagram of a geothermal spring sampling gas collection system.

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CHAPTER HEAD BEGIN SECTIONS HERE

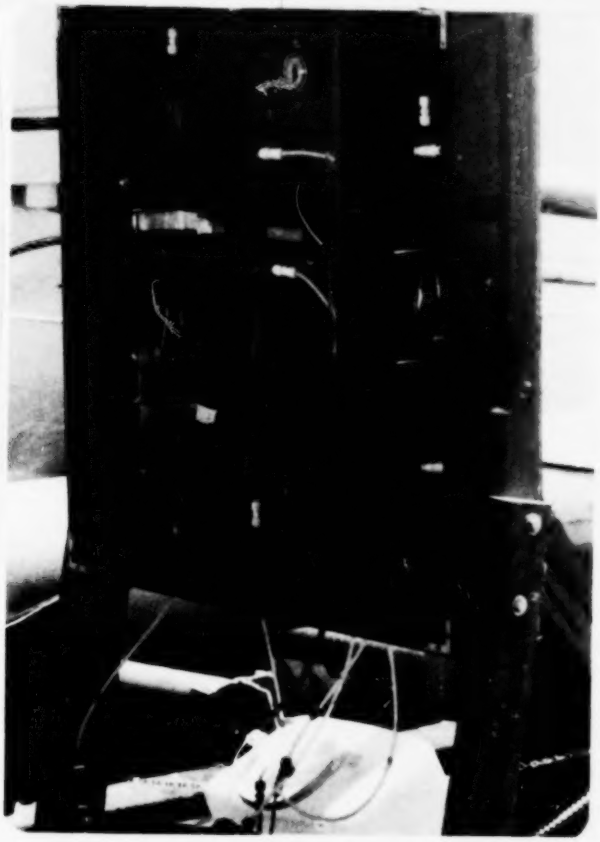

Figure 4. TRW's well sampling equipment

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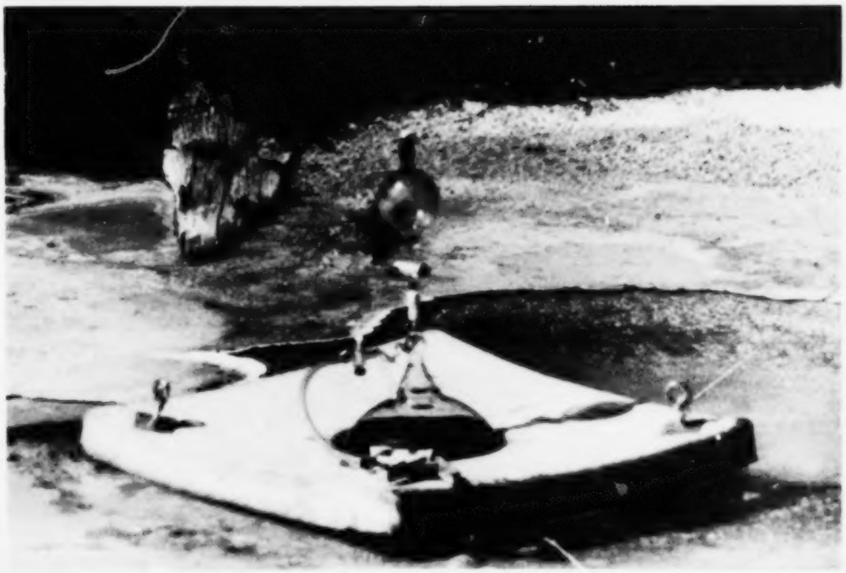


Figure 5. TRW's spring sampling equipment.

TABLE 2. SAMPLE CONTAINERS AND PRESERVATIVES

Container Designation	Container Volume	Preservative	Parameters
A	2000 ml (FA)	2 ml conc. HNO_3	Ba, Be, Sr, Al, V, Cr, Mo, Pb, Ni, Tl, Bi, Ag, Cd, Cu, Zn, Ti, Sn
B	250 ml (FA)	5 ml conc. H_2SO_4	As, Se, Sb, Hg
C	250 ml (FA)	1 ml conc. HCl	Na, K, Li, Rb, Cs, Ca, Mg, Fe, Mn
D	500 ml (RD)	50 ml sample 450 D.I. Water	$SiO_2^{=}$
E	100 ml (F)	0.1g $HgCl_2$	$PO_4^{=}$
F	500 ml (F)	None	TDS, F, $SO_4^{=}$, Cl^-, B
G	4000 ml (RA)	5 ml conc. HNO_3	Rn^{226}, Rn^{222}, Th^{232}, Th^{234}, U^{238}
H	47 mm Dia.	None	Algae
I	2000 ml plastic container (R)	None	Misc.
J	200 ml Flask	None	CO_2, CO, CH_4
K	100 ml	15 ml 0.1 N HCl 10 ml D.I. water	NH_3

Legend:

R - raw (unfiltered)
RA - raw and acidified
RD - raw and diluted
F - filtered through 0.2 μm membrane
FA - filtered and acidified

Upon cooling of geothermal fluids, silica, where original concentrations exceed 100 mg/l, may polymerize and subsequently precipitate out of the solution. For this reason, silica samples were preserved immediately after sampling by diluting the geothermal liquid (50 ml) with distilled water (450 ml). Since suspended particles in geothermal fluids might induce precipitation of metallic ions from solution, filtration was necessary for preserving dissolved metals for laboratory analyses. The U.S. Geological Survey recommended a 0.1μm filter instead of the conventional 0.45μm for filtration, because fine particles of ferric hydroxide might pass through the latter. The contractor determined, however, that a 0.2μm filter was as effective as, and more economical than, the 0.1μm filter. All filtrations for this sampling program were, therefore, performed using the 0.2μm filter.

The preservation of trace metals for laboratory analysis is normally done by acidifying the water sample with concentrated nitric acid (HNO_3) to a pH below 2. For geothermal samples the choice of acid is very important because several analyses are subject to interferences. For example, hydrochloric acid interferes with the analysis of silver and lead because insoluble chlorides may be formed. Sulfuric acid interferes with the analysis of calcium and magnesium and some of the heavy metals. Nitric acid interferes with the analysis of strontium and calcium. In addition, the formation of hydrides for As, Se, and Sb determination requires the absence of any oxidizing agents such as HNO_3. For these reasons, both HCl and H_2SO_4 are used where HNO_3 becomes ineffective. Table 2 summarizes the number and volume of samples processed at a site, the types and quantities of preservatives and the parameters analyzed.

In general, all sample bottles, dark brown polyethylene for liquid and glass for gases, were pre-cleaned by first rinsing with 10 percent nitric acid and then with several (minimum of three) washings with deionized water before use. All liquid samples were transferred from the stainless steel container directly through the filter into individual sample bottles with minimum aeration. To insure that the liquid samples would not leak or blow up during air transportation because of the significant pressure differential, the following procedure was implemented. All liquid sample bottles were required to have a minimum of 5 ml air space. Before a liquid sample bottle cap was tightened, a slight pressure was applied to squeeze out the air in the bottle. The cap was then closed tightly and tape was applied to seal the bottle. Prior to air transportation, samples were kept cool to minimize sample degradation.

All gas sample bottles were packaged in boxes with foam packing material to minimize breakage. Liquid samples were placed in heavy duty trunks. All shipping boxes and containers were properly labelled and secured by the sampling crew at the end of each site sampling.

ANALYSIS METHODOLOGIES

Analysis of geothermal fluids included both field and laboratory analyses. The following is a summary of the approach utilized for each. Detailed discussions on stability of constituents and reagent preparation were presented in the Sampling and Analysis Plan and are not described further in this report.

Field Analysis

Immediate on-site analysis was required for unstable parameters that could not reasonably be preserved. Constituent analysis and measurements most susceptible to rapid change were done first. For example, pH and temperature were measured immediately after collection. Radon, because of its relatively short half life, was also determined in the field by a portable radon counter, Ludlum Measurements Model 2200. This instrument, as well as the analysis procedures, were reviewed and approved by Dr. M. O'Connell of EPA, Las Vegas. Alkalinity was determined in the field by acid titration with 0.02 N H_2SO_4 routinely prepared and standardized in the main laboratory and verified occasionally in the field. Hydrogen sulfide (H_2S) as well as CO_2, O_2 and CO were originally proposed for analysis in the field by gas chromatograph (GC) techniques. Because of instability of the instrument (couldn't obtain a stable base-line during operation), the use of GC for these gas analyses was discontinued. The following is a generalized discussion on gas sample processing for either direct analysis, preservation, or storage for laboratory analysis.

The gases to be analyzed were first split into two basic categories: stable and reactive species. H_2S, NH_3 and radon decay rapidly with time; therefore, these gases needed to be analyzed immediately in the field or preserved for laboratory analysis at a later date. The H_2S was removed from the gas sample bulb by scrubbing the H_2S with a zinc acetate (ZnAc) solution which was injected via a syringe into the sample bulb. The mixture was then vigorously shaken for absorption of H_2S. The scrubbed H_2S in zinc acetate solution was subsequently analyzed in the field at the same time as the sulfide determination from the brine solution. Ammonia (NH_3) gas was scrubbed by injecting into a gas sample bulb 25 ml of a solution containing 15 ml of 0.1 N HCl and 10 ml of deionized water followed by vigorous shaking for NH_3 gas absorption. The NH_3 sample was thus preserved for laboratory analysis by distillation and nesslerization. The detailed procedures for sulfide analysis can be found in Appendix D and ammonia was determined by using the nesslerization method (418B) as described in Standard Methods for the Examination of Water and Wastewater.

Laboratory Analysis

All samples brought back from the field were properly labelled on individual bottles, as to location, site number, date, time, and type of samples, analysis required, preservatives added and the initials of the sampler. These samples were immediately logged, with an assigned lab number, and distributed by the chemist in charge to the appropriate lab personnel for analysis. Any unusual observations (i.e., leaked bottles, etc.) were documented. Less stable constituents were analyzed or processed immediately. Samples for analysis of more stable constituents were stored under refrigeration to be analyzed later collectively.

Within 72 hours of arrival at the laboratory, CO, CO_2 and O_2 were analyzed by gas chromatograph. Phosphates, sulfates and other anions were analyzed collectively at the earliest convenience. Algae samples were dried, crushed, and quantitatively weighed to approximately 1 gm. The dried sample was acid digested to liberate all trace metals. The digested algae samples were stored in labelled plastic bottles and were analyzed collectively at a later date.

The analytical methodologies for various constituents are shown in Table 3. Because of the high salt concentration in most geothermal fluids, trace metal analyses were rather complex. Segregation of the sample into fractions was necessary for accurate determination of the various metal concentrations. For simplicity, trace metal analyses were divided into four fractions: 1) volatile metal analysis; 2) HCl-preserved insensitive metals; 3) HNO-preserved sensitive metals; and 4) HNO_3-preserved insensitive metals. Sensitivity is defined as the concentration of an element which would give 0.0044 absorbance units on the atomic absorption instrument. For this report, insensitive metals are those that have detection limits greater than 0.5μg/ml (or 0.5 ppm), and sensitive metals are those with detection limits less than 0.05 μg/ml. Metals with detection limits between sensitive and insensitive metals are defined as less sensitive metals. Volatile metal analysis involved the quantitative determination of As, Se, Sb, and Hg. HCl-preserved insensitive metals analysis included Fe, Ca, Mg, Mn, Na, K, Li, Rb, and Cs. HNO_3-preserved sensitive metals involved the analysis of Be, Sn, Ba, Al, V, Cr, Bi, Tl, Pb, Mo, Ni, Ag, Cd, Cu, and Zn. HNO_3-preserved insensitive metals were Ti and Sn. The systematic steps in the analysis of these four fractions of trace metals are illustrated in Figures 6, 7, 8, and 9.

For quality control, both the atomic absorption spectrophtometer (AA) and the gas chromatograph (GC) were calibrated and standardized routinely prior to any analysis of the geothermal fludis. The AA was calibrated by standard addition technique and the GC was calibrated using a standard gas. The detection limit and accuracy of the analytical methodogies for the various constituents are shown in Table 4.

TABLE 3. SUMMARY OF ANALYSIS METHODOLOGIES

Metholology Code	Constituents to be Analyzed by the Methodology
A	Fe, Ni, Mn, Mo, Pb, Ti, Tl, Ag, Sn
B	K
C	Cu, Zn, Cd
D	Rb, Cs, Be, Mg, Ca, Sr, Ba, Al, Cr, V, Na, Li
E	As, Se, Sb, Hg
F	CO, CO_2
G	CH_4
H	SO_4
I	PO_4
J	Cl
K	NH_3
L	SS
M	TDS
N	B
O	SiO_2

TABLE 3. (Continued)

Legend:

Methodology Code	Method Description
A	Sample is filtered and acidified to pH 1.5, digested with HNO_3 on hot plate. Sample is analyzed by Atomic Absorption using method of standard additions.
B	Same as A except digestion is omitted.
C	Same as A except method of standard additions is omitted
D	Same as A except samples and standards are made up in 0.1% KCl as an ionization suppressant.
E	Same as A except after digestion 10 ml of concentrated H_2SO_4 is added and sample is heated to SO_3 fumes and analyzed by Atomic Absorption of the reduced species.
F	Gas Chromatography using thermal conductivity detector.
G	Gas chromatography using flame ionization detector.
H	EPA Method 8 - for Stationary Sources Extraction with isopropyl alcohol and titrate with $Ba(Cl\ O_4)_2$ using thorin as indicator.
I	Stannous Chloride Method for $PO_4^=$ determination as described by "Standard Methods" 14th Ed.
J	Specific ion electrode method as described in "Standard Methods" 14th Ed.
K	Nesslerization Method for ammonia following distillation as described in "Standard Methods" 14th Ed.
L	Filter is dessicated until constant wt. is achieved ($\pm$ 0.2 mg). Tare wt. of filter is subtracted then divided by liters of sample filtered.
M	100 ml of filtered sample is evaporated in a 150 ml beaker previously dessicated to constant wt.
N	Carmine photometric method as described in "Standard Methods" 14th Ed.
O	Molybdosilicate method for SiO_2 as described in "Standard Methods" 14th Ed.

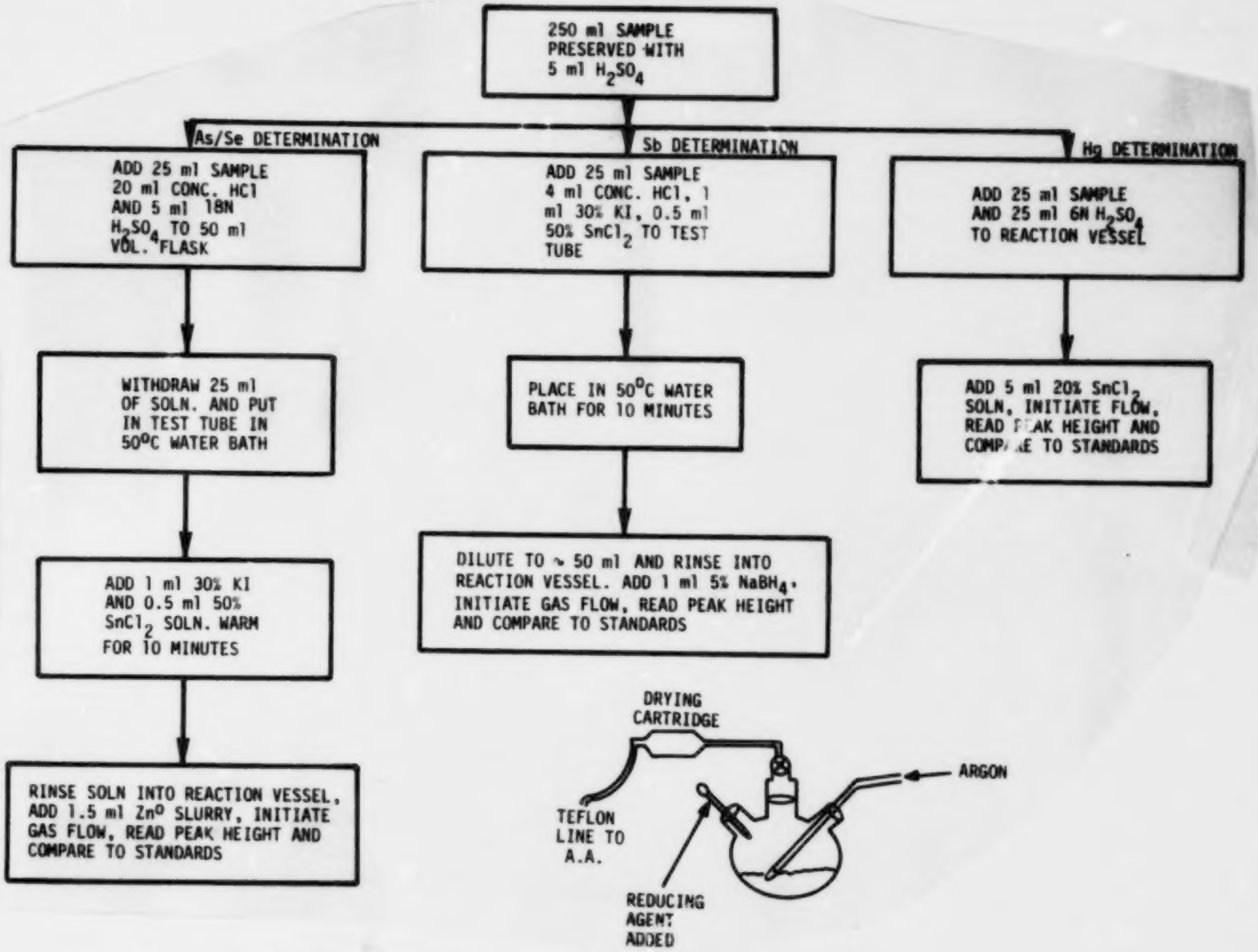

250 ml SAMPLE PRESERVED WITH 5 ml H_2SO_4
As/Se DETERMINATION
Sb DETERMINATION
Hg DETERMINATION
ADD 25 ml SAMPLE 20 ml CONC. HCl AND 5 ml 18N H_2SO_4 TO 50 ml VOL. FLASK
WITHDRAW 25 ml OF SOLN. AND PUT IN TEST TUBE IN 50°C WATER BATH
ADD 1 ml 30% KI AND 0.5 ml 50% $SnCl_2$ SOLN. WARM FOR 10 MINUTES
RINSE SOLN INTO REACTION VESSEL, ADD 1.5 ml Zn° SLURRY, INITIATE GAS FLOW, READ PEAK HEIGHT AND COMPARE TO STANDARDS
ADD 25 ml SAMPLE 4 ml CONC. HCl, 1 ml 30% KI, 0.5 ml 50% $SnCl_2$ TO TEST TUBE
PLACE IN 50°C WATER BATH FOR 10 MINUTES
DILUTE TO ~ 50 ml AND RINSE INTO REACTION VESSEL. ADD 1 ml 5% $NaBH_4$, INITIATE GAS FLOW, READ PEAK HEIGHT AND COMPARE TO STANDARDS
ADD 25 ml SAMPLE AND 25 ml 6N H_2SO_4 TO REACTION VESSEL
ADD 5 ml 20% $SnCl_2$ SOLN, INITIATE FLOW, READ PEAK HEIGHT AND COMPARE TO STANDARDS
DRYING CARTRIDGE
ARGON
TEFLON LINE TO A.A.
REDUCING AGENT ADDED

Figure 6. Volatile metal analysis scheme.

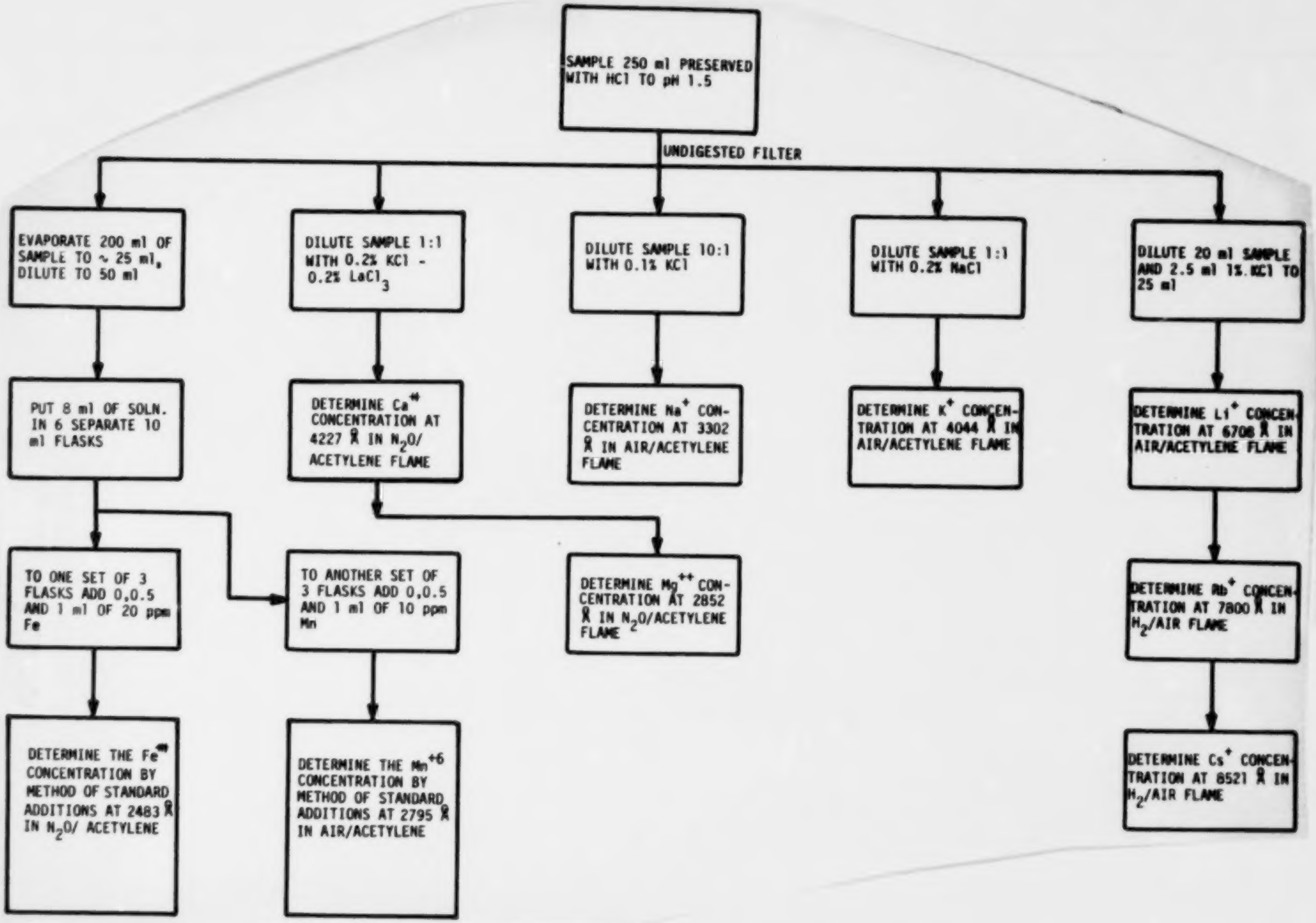

SAMPLE 250 ml PRESERVED WITH HCl TO pH 1.5
UNDIGESTED FILTER
EVAPORATE 200 ml OF SAMPLE TO ~ 25 ml, DILUTE TO 50 ml
PUT 8 ml OF SOLN. IN 6 SEPARATE 10 ml FLASKS
TO ONE SET OF 3 FLASKS ADD 0,0.5 AND 1 ml OF 20 ppm Fe
DETERMINE THE Fe^{++} CONCENTRATION BY METHOD OF STANDARD ADDITIONS AT 2483 Å IN N_2O/ ACETYLENE
TO ANOTHER SET OF 3 FLASKS ADD 0,0.5 AND 1 ml OF 10 ppm Mn
DETERMINE THE Mn^{+6} CONCENTRATION BY METHOD OF STANDARD ADDITIONS AT 2795 Å IN AIR/ACETYLENE
DILUTE SAMPLE 1:1 WITH 0.2% KCl - 0.2% $LaCl_3$
DETERMINE Ca^{++} CONCENTRATION AT 4227 Å IN N_2O/ ACETYLENE FLAME
DETERMINE Mg^{++} CONCENTRATION AT 2852 Å IN N_2O/ACETYLENE FLAME
DILUTE SAMPLE 10:1 WITH 0.1% KCl
DETERMINE Na^+ CONCENTRATION AT 3302 Å IN AIR/ACETYLENE FLAME
DILUTE SAMPLE 1:1 WITH 0.2% NaCl
DETERMINE K^+ CONCENTRATION AT 4044 Å IN AIR/ACETYLENE FLAME
DILUTE 20 ml SAMPLE AND 2.5 ml 1% KCl TO 25 ml
DETERMINE Li^+ CONCENTRATION AT 6708 Å IN AIR/ACETYLENE FLAME
DETERMINE Rb^+ CONCENTRATION AT 7800 Å IN H_2/AIR FLAME
DETERMINE Cs^+ CONCENTRATION AT 8521 Å IN H_2/AIR FLAME

Figure 7. HCl preserved metals analysis scheme.

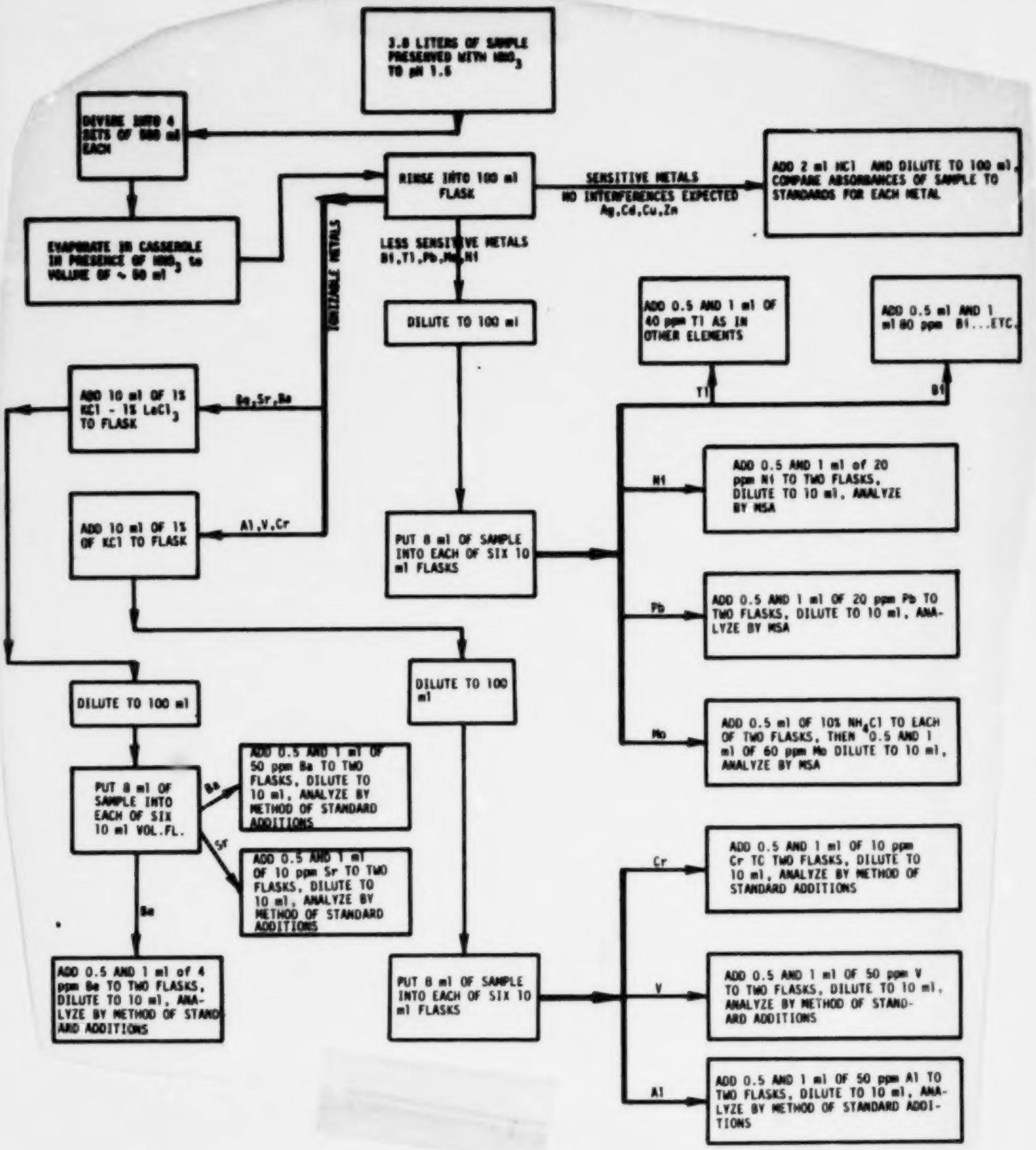
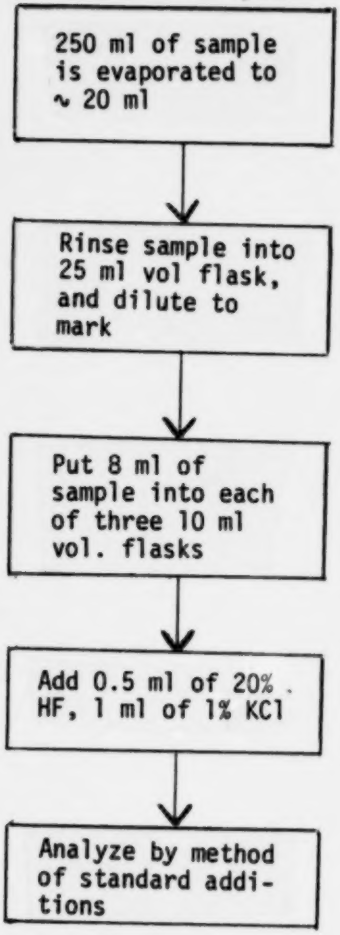

3.8 LITERS OF SAMPLE PRESERVED WITH HNO_3 TO pH 1.6
DIVIDE INTO 4 SETS OF 900 ml EACH
EVAPORATE IN CASSEROLE IN PRESENCE OF HNO_3 to VOLUME OF ~ 80 ml
RINSE INTO 100 ml FLASK
SENSITIVE METALS
NO INTERFERENCES EXPECTED
Ag,Cd,Cu,Zn
ADD 2 ml HCl AND DILUTE TO 100 ml, COMPARE ABSORBANCES OF SAMPLE TO STANDARDS FOR EACH METAL
IONIZABLE METALS
LESS SENSITIVE METALS
Bi,Tl,Pb,Mo,Ni
DILUTE TO 100 ml
ADD 0.5 AND 1 ml OF 40 ppm Tl AS IN OTHER ELEMENTS
ADD 0.5 ml AND 1 ml 80 ppm Bi...ETC.
Tl
Bi
Be,Sr,Ba
ADD 10 ml OF 1% KCl - 1% $LaCl_3$ TO FLASK
Ni
ADD 0.5 AND 1 ml of 20 ppm Ni TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY MSA
Al,V,Cr
ADD 10 ml OF 1% OF KCl TO FLASK
PUT 8 ml OF SAMPLE INTO EACH OF SIX 10 ml FLASKS
Pb
ADD 0.5 AND 1 ml OF 20 ppm Pb TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY MSA
DILUTE TO 100 ml
DILUTE TO 100 ml
Mo
ADD 0.5 ml OF 10% NH_4Cl TO EACH OF TWO FLASKS, THEN 0.5 AND 1 ml OF 60 ppm Mo DILUTE TO 10 ml, ANALYZE BY MSA
PUT 8 ml OF SAMPLE INTO EACH OF SIX 10 ml VOL.FL.
Ba
ADD 0.5 AND 1 ml OF 50 ppm Ba TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY METHOD OF STANDARD ADDITIONS
Sr
ADD 0.5 AND 1 ml OF 10 ppm Sr TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY METHOD OF STANDARD ADDITIONS
Cr
ADD 0.5 AND 1 ml OF 10 ppm Cr TC TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY METHOD OF STANDARD ADDITIONS
Be
ADD 0.5 AND 1 ml of 4 ppm Be TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY METHOD OF STANDARD ADDITIONS
PUT 8 ml OF SAMPLE INTO EACH OF SIX 10 ml FLASKS
V
ADD 0.5 AND 1 ml OF 50 ppm V TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY METHOD OF STANDARD ADDITIONS
Al
ADD 0.5 AND 1 ml OF 50 ppm Al TO TWO FLASKS, DILUTE TO 10 ml, ANALYZE BY METHOD OF STANDARD ADDITIONS

Figure 8. HNO_3 preserved sensitive metal analysis scheme.

Titanium Analysis


250 ml of sample is evaporated to ~ 20 ml
Rinse sample into 25 ml vol flask, and dilute to mark
Put 8 ml of sample into each of three 10 ml vol. flasks
Add 0.5 ml of 20% HF, 1 ml of 1% KCl
Analyze by method of standard additions

Tin Analysis

Due to tin's low sensitivity and to strong interference from Groups IA and IIA metals, concentration by evaporation is not applicable. No analytically useful extraction technique has been developed. No ion exchange technique is applicable to the separation of Groups IA and IIA from tin in natural waters.

Thus a simple method of standard additions will be performed to detect any tin on unconcentrated samples.

Figure 9. HNO_3 preserved insensitive metals analysis scheme.

TABLE 4. DETECTION LIMIT AND ACCURACY FOR CONSTITUENT ANALYSIS METHODOLOGY

PARAMETERS	ANALYSIS TECHNIQUE	OPTIMUM CONC. RANGE (mg/l)	DETECTION LIMIT	RELATIVE STANDARD DEVIATION
Ag	A.A.	0.1 - 5	0.01 mg/l	Not available
Al	A.A.	5 - 200	0.4 mg/l	38.9% at 1 mg/l
As	A.A.		0.005 mg/l	43.1% at 10 ug/l
B	Carmine		0.002 mg/l	22.8% at 240 ug/l
Ba	A.A.	2 - 50	0.2 mg/l	10.8% at 4 mg/l
Be	A.A.	0.3 - 3	0.01 mg/l	3.0% at 250 ug/l
Bi	A.A.	5 - 50	0.2 mg/l	Not available
Ca	A.A.	0.3 - 3	0.05 mg/l	3.3% at 9 mg/l
Cd	A.A.	0.3 - 2.5	0.01 mg/l	23.1% at 78 ug/l
Cr	A.A.	1 - 10	0.05 mg/l	28.3% at 370 ug/l
Cs	A.A.	1 - 10	0.1 mg/l	Not available
Cu	A.A.	0.5 - 7	0.02 mg/l	18.5% at 300 ug/l
Fe	A.A.	0.5 - 10	0.02 mg/l	20.6% at 1 mg/l
K	A.A.	0.5 - 3	0.1 mg/l	8.0% at 1 mg/l
Li	A.A.	0.5 - 4	0.1 mg/l	Not available
Mg	A.A.	0.06 - 0.5	0.01 mg/l	4.8% at 1 mg/l
Mn	A.A.	0.5 - 5	0.02 mg/l	16.4% at 300 ug/l
Mo	A.A.	5 - 100	0.2 mg/l	7.5% at 1 mg/l
Na	A.A.	50 - 500	0.02 mg/l	1.2% at 10 mg/l
Ni	A.A.	1 - 12	0.05 mg/l	2.0% at 1 mg/l
Pb	A.A.	2 - 50	0.05 mg/l	34.8% at 300 ug/l
Hg	A.A.		0.0001 mg	52.0% at 5 ug
Rb	A.A.	1 - 10	0.1 mg/l	Not available
Sb	A.A.		0.001 mg	56% at 10 ug
Se	A.A.		0.001 mg	30% at 10 ug
Si	Molybdosilicate	1000 - 50	1 mg/l	12.5% at 5 mg/l
Sn	A.A.	10 - 150	2 mg/l	62% at 5 mg/l
Sr	A.A.	1 - 10	0.1 mg/l	Not available
Ti	A.A.	25 - 200	0.5 mg/l	70% at 2 mg/l
Tl	A.A.	5 - 50	0.1 mg/l	20% at 1 mg/l
V	A.A.	10 - 120	0.2 mg/l	52% at 1 mg/l
Zn	A.A.	0.2 - 2	0.01 mg/l	11.3% at 300 ug/l
PO_4^{-3}	Stannous Chloride	0.10 - 0.02	0.003 mg/l	7.6% at 7 mg/l
SO_4^{-2}	Indirect A.A.	1000 - 100	5 mg/l	20% at 50 mg/l
NH_3	Nesslerization	10 - 0.1	0.01 mg/l	69.8% at 800 ug/l
CO	TCD - GC		0.01%	10.0% at 0.1% by Vol.
CO_2	TCD - GC		0.01%	10.0% at 0.1% by Vol.
CH_4	FID - GC		1 ppm	10.0% at 1 mg/l
SS	Gravimetric		0.2 mg/l	2% at 500 mg/l
TDS	Gravimetric		0.2 mg/l	5% at 500 mg/l
Cl^-	Ferricyanide	100 - 5	0.5 mg/l	8.7% at 1 mg/l

QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

The Quality Assurance/Quality Control effort is aimed primarily at insuring that all data collected and reported are meaningful, precise and accurate. The objective is accomplished by:

- verifying adherence to equipment specification and procedure requirements
- performing a continuing evaluation of the adequacy and effectiveness of the overall Quality Control program, and requiring correction of weakness.

Quality Control Level

To insure that data quality is adequate to meet projected requirements, quality control was instituted in the following areas: field operating procedure adherence, sampling procedure adherence, analysis procedure adherence, sample identification and traceability, equipment calibration and maintenance, etc.

Quality Assurance Level

In order to optimize quality assurance, sources of errors were identified, and documented, and corrective measures were instituted. An indoctrination and training program was implemented so that all field team members were aware of proper procedures.

The following subsections discuss specific areas of QA/QC and what controls were used to assure that quality data were obtained.

Field Operating Procedures

- Instruction and Information Provided to the Field Crew:

  During the training and indoctrination program, detailed sampling requirements were presented to all key field team members. A discussion of the operating procedure was presented in the Sampling Plan Manual developed prior to actual sampling and was approved by the EPA project officer. These procedures were strictly adhered to by all operating field personnel. Any deviation from the standard procedure was reported to the project manager or his designee.

- Field Logs: Logs identifying the scheduled times at which specific assignments were performed were maintained. Any special observations and/or problems encountered during each data collection phase, including equipment breakdown, personnel injury or illness, instrument malfunctioning and process changes were documented.

- Maintenance and Calibration of Field Equipment and Instruments:

  Records were maintained for all field equipment and instruments. A maintenance schedule was posted in the van in which equipment was located. All operating personnel were required to adhere to the maintenance program.

- Spare Parts: Spare equipment, components and parts were identified prior to field deployment and were kept in the van and replenished whenever they were used.

Field Sampling and Analysis Procedures

- Sample Processing: All samples collected from geothermal sites were processed on the same day of collection. Prior to any analyses, all collected samples were kept cool in the dark areas of the van. Samples to be shipped back to the main laboratory were processed as discussed in the Test Plan Execution Section.

- Sample Analysis: Field analysis of samples was performed on either the same day or within 24 hours from collection. Samples for laboratory analysis were forwarded to the main TRW laboratory approximately every ten days. Field analysis procedures were adhered to by field personnel in accordance with those procedures presented in Appendices D and E.

- Required Standards: All standards for both field and laboratory analysis were procured and used in accordance with procedures adopted by the TRW analytical manual and those prescribed and approved by EPA laboratories.

- Identification and Storage of Samples: Samples were identifed by a code number incorporating site number, container identifier code, date, and sample volume. Included on the label were also the sampler's name and what preservatives were added. Samples were kept cool prior to air shipment.

- Sample Tracking System: Each sample shipped back to the main laboratory was recorded on a traceability form, initiated at the time the samples were collected, and updated at each change of sample status. Thus, the location, status, source, and analytical results for every sample collected was immediately traceable at any time.

- Document and Procedures Control: All documents or procedures to be used in this program were approved by the TRW internal quality assurance group. Procedures were strictly adhered to regarding all aspects of cleaning, sampling, analysis, equipment calibration, lab certification, etc.

Analytical Procedures

- Sample Handling: The handling of samples in the field and laboratory was controlled and documented.

- Analytical Procedures: Standard methods and procedures were employed for the analysis of samples. Analytical flow charts and procedures were presented in the Test Plan Execution Section.

- Preparation of Reagents: The preparation of reagents and materials was carried out under strict laboratory control. Pertinent records relating to reagent preparation were also maintained.

- Laboratory Ledgers: Bound ledgers, signed out from the company patent office, were used to record and store actual laboratory and supporting data. These ledgers were retained for future use, if required.

- Analytical Uncertainties: Some uncertainties exist in all analytical procedures. Detailed descriptions of each of the analysis limitations and detection limits were presented in the Sampling Plan document. These procedures were designed to minimize both positive and negative bias.

- Reliability of Data: A program was instituted to ensure both precision and accuracy of sampling and analyses in compliance with EPA guidelines. The system took into account the different requirements of each level. Blanks were run for each batch of each type of analysis.

- Monitoring Daily Performance: Charts and reports were prepared daily to assess and control the progress of the sampling and analytical efforts. These performance controls allowed for instant identification of problem areas and their evaluation and alleviation.

HEALTH AND SAFETY

Specific safety procedures and equipment were used by all field sampling personnel. The procedures and equipment are discussed below.

Sampling Van

The sampling van was equipped with the following emergency equipment for use in the event of van breakdown in remote areas: drinking water, canned food, citizens band radio (CB), spare parts, tools and flares.

The sampling team was instructed not to leave the van in the event of a breakdown, unless assistance could be easily reached. The CB could be used to contact assistance within a distance of 4 to 10 miles. The sampling crew was instructed to call home base daily to confirm sites sampled and obtain new itineraries. Through this mechanism, the home base would know of trouble should a routine call be missed. The canned food and drinking water were provided for two people in quantities adequate to last a maximum of three (3) days.

Sampling Procedures

Specific safety procedures were followed while obtaining the samples from geothermal wells and springs. Safety goggles and gloves were required to be worn while sampling wells. The goggles were used to protect the eyes from exposure to hot geothermal brine, steam or glassware which might shatter during sampling. Rubber gloves were used to prevent burns while handling hot sampling equipment.

SECTION 4

SUMMARY OF ANALYSIS RESULTS

The culmination of this study produced the following products: 1) Data Assessment; 2) A Sampling Manual for Geothermal Sites; and 3) Sampling and Analysis of Potential Geothermal Sites. The following subsections summarize the results of these three products.

DATA ASSESSMENT

The main objective for historical data assessment was to evaluate the existing geothermal data base at each of the selected geothermal sites in terms of data adequacy and validity. Table 5 is a summary analysis of each of the sites relevant to the adequacy of the existing data base. Because of the lack of specific information regarding sampling and analysis methodologies as well as the agencies involved in sampling, assumptions had to be made rather subjectively during the data assessment effort. A set of criteria, quite arbitrarily selected, was used for evaluating the data available on each site. As a result, some of the conclusions arrived at, relevant to data adequacy, may be somewhat biased.

A SAMPLING MANUAL FOR GEOTHERMAL SITES

The intent of the sampling manual is to provide information regarding individual geothermal sites in sufficient detail that the sampling methodology can be reproduced at those sites in any future program. Analytical data gathered in the future will then have a more common base for comparison.

The sampling manual contains the following elements: 1) step-by-step procedures for sampling both wells and springs; 2) field analysis methodologies for measuring pH, conductivity, alkalinity, sulfide and radon; 3) sample preservation methods, and 4) site logs.

SAMPLING AND ANALYSIS OF POTENTIAL GEOTHERMAL SITES

The geothermal sites at which fluid samples (liquid and/or gas) were collected are listed in Table 1 and their approximate locations are shown in Figure 1. The reasons why these sites were selected for sampling are also depicted in Table 1. The laboratory analysis procedures are delineated in Table 3. Specific details regarding the exact sampling locations, field sampling procedures, and field analysis methodologies are given in the Sampling Manual report. The field and laboratory measurement data for geothermal fluids were compiled and are presented in Appendix F. The geothermal data are grouped alphabetically by state; within each state the geothermal sites are arranged numerically according to preassigned site numbers. The measurement data in-

TABLE 5. DATA ASSESSMENT OF GEOTHERMAL SITES BY STATE

STATE: ARIZONA

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT	Alt. 1	2	Indian H.S.
	Alt. 3	140	Verde H.S.
ADEQUATE	2	7	Gillard H.S.
	3	5	Mt. Graham
	4	8	Agua Caliente
	5	14	Castle H.S.
	Alt. 2	6	Clifton H.S.
	Alt. 4	1	Hooker H.S.
INSUFFICIENT			
NO DATA	1	137	Power Ranches (Chandler)

STATE: CALIFORNIA

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT	1	25-26	East Mesa-Burec
	22	149	Reds Meadow H.S.
	Alt. 1	151	Mono H.S.
ADEQUATE	9	142	Coso H.S.
	11	40	Surprise Valley
	12	36	Kelley H.S.
	13	32	Wendel H.S.
	15	143	Long Valley
	16	39	Leonards H.S.
	17	253	Amedee H.S.
	18	42	Fales H.S.
INSUFFICIENT	6 A-B	158	Heber
	Alt. 3	150	Sespe H.S.
	Alt. 2	153	Warner H.S.
	4	156	Niland
NO DATA	2	254	East Mesa - Magma
	3	255	East Mesa - Republic Geoth.
	5A-C	157	Brawley
	7	212	Westmorland
	8	213	Susanville
	10	147	Calistoga H.S.
	14	144	Clear Lake
	19	145	Morgan H.S.
	20	146	Wilbur H.S.
	21	148	Skaggs H.S.

TABLE 5. (Continued)

STATE: COLORADO

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT	1	60	Mineral (Chamberlain) H.S.
	2	46	Hortense
	4	47	Poncha H.S.
	5	54	Waunita H.S.
	6	52	Glenwood H.S.
	8	57	Routt H.S.
	9	45	Cottonwood H.S.
	Alt. 3	176	Idaho H.S.
	Alt. 4	53	Hot Sulphur Springs
ADEQUATE	3	48	Young Life
	7	58	Steamboat H.S.
	10	55	
INSUFFICIENT	Alt. 1	775	Mt. Princeton
NO DATA	Alt. 2	56	Penney H.S.

STATE: IDAHO

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT			
ADEQUATE	1	63	Raft River
	8	219	Big Creek H.S.
	Alt. 4	167	Starkey H.S.
INSUFFICIENT	2	162	Bruneau-Grandview
	3	163	Crane Creek H.S.
	4	171	N.E. Boise Thermal
	5	164	Weiscr H.S.
	6	165	Vincent H.S.
	7	170	Vulcan H.S.
	9	221	Boiling Springs
	10	228	Bonneville H.S.
	11	64	Sunbeam H.S.
	12	223	Maple Grove H.S.
	13	226	Neinmeyer H.S.
	14	229	Wardrop H.S.
	15	166	Battle Creek H.S.
	16	61	Condie H.S.
	17	230	White LicKs H.S.
	Alt. 1	220	Murphy H.S.
	Alt. 2	65	Salmon H.S.
	Alt. 3	169	Riggins H.S.
	Alt. 5	168	Red River H.S.
	Alt. 6	226	Roystone H.S.
	Alt. 7	227	Latty H.S.
	Alt. 8	231	Sharkey H.S.
NO DATA			

TABLE 5. (Continued)

STATE: MONTANA

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT			
ADEQUATE	1	202	Alhambra H.S.
	3	204	Gregson H.S.
	4	203	Boulder H.S.
	5	206	Barkels Silver Star
	Alt. 1	208	Jardine H.S.
	Alt. 2	205	Pipestone H.S.
	Alt. 3	207	Norris H.S.
	Alt. 4	200	Helena H.S.
INSUFFICIENT			
NO DATA	2	250	Thexton H.S.

STATE: NEVADA

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT	3 A-B	187	Soda Lake
	19	79	Leach H.S.
	Alt. 6	245	Buffalo Valley
	Alt. 9	248	Bowers Mansion
ADEQUATE	5	68	Stillwater
	6	244	Hot Springs Point
	7	233	Darrough H.S.
	9	217	Lee H.S.
	10	75	Beowawe
	11	84	Lawton H.S.
	12	88	Steamboat H.S.
	14	186	Baltazor H.S.
	16	78	Wabuska H.S.
	17	210	Kyle H.S.
	20	83	Great Boiling H.S.
	22	237	Dixie H.S.
	23	72	Hot Hole Elko
	24	243	Sulphur H.S.
	25	71	Walley's H.S.
	26	239	Sou H.S.
	Alt. 1	248	The Needle Rocks
	Alt. 2	73	Hot Sulphur Springs
	Alt. 3	74	Spring Near Carlin
	Alt. 4	77	Golconda H.S.
	Alt. 5	188	Pinto H.S.
	Alt. 10	236	Diana's Punch Bowl
INSUFFICIENT	1	67	Brady H.S.
	13	174	Fly Ranch
	18	90	Monte Neva H.S.
NO DATA	2	232	Desert Peak
	4	234	Humboldt (Rye Patch)
	8	235	San Emidio Desert
	15	241	Moana H.S.
	Alt. 7	246	Caliente H.S.
	Alt. 8	247	Lockes H.S.

TABLE 5. (Continued)

STATE: NEW MEXICO

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT	3	92	Radium H.S.
	4	94	Gila H.S.
	5	100	Jemez H.S.
ADEQUATE	1	179	Valles Caldera
	6	93	Faywood H.S.
	7	97	Ojo Caliente H.S.
	Alt. 1	101	Soda Dam H.S.
	Alt. 2	102	Sulphur Springs
	Alt. 3	91	Lower Frisco H.S.
INSUFFICIENT	2	251	Truth or Consequences
NO DATA			

STATE: OREGON

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT			
ADEQUATE	2	120	Hunters Lodge
	3	121	Barry's Ranch
	4	138	Breitenbush H.S.
	5	184	Alvord H.S.
	6	180	Mickey H.S.
	7	182	Vale H.S.
	8	185	Hot Lake
	Alt. 1	183	Crumps Springs
INSUFFICIENT			
NO DATA	1	181	Klamath Falls

TABLE 5. (Continued)

STATE: UTAH

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT	6	127	Baker (Abraham) H.S.
	12	178	Joseph H.S.
ADEQUATE	6	131	Red Hill H.S.
	7	125	Utah (Bear River) H.S.
	8	122	Thermo H.S.
	10	123	Crystal (Masden) H.S.
	11	134	Pah Tempe H.S.
	13	129	Wasatch H.S.
	Alt. 1	130	Monroe H.S.
	Alt. 2	136	Ogden H.S.
	Alt. 3	126	Hooper H.S.
	Alt. 4	133	Midway H.S.
	Alt. 5	132	Saratoga H.S.
	Alt. 6	124	Stinking H.S.
INSUFFICIENT	1 A-B	173	Roosevelt H.S.
NO DATA	2	177	Cove Fort
	3	214	Dearman Well
	4	215	State #1 Well
	5	216	Jones #18 Well

STATE: WASHINGTON

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT			
ADEQUATE	3	191	Baker H.S.
INSUFFICIENT	1	195	Sol Duc H.S.
	2	196	Olympic H.S.
	4	194	Ohanapecosh H.S.
NO DATA			

TABLE 5. (Continued)

STATE: WYOMING

SITE CLASSIFICATION	PRIORITY NUMBER	SITE NUMBER	SITE NAME
EXCELLENT			
ADEQUATE			
INSUFFICIENT			
NO DATA	1	198	Huckelberry H.S.
	2	199	Auburn H.S.
	3	252	Thermopolis H.S.

clude four major categories: physical measurements, chemical analysis for major constituents, radioactivity analysis and chemical analysis for minor constituents. In addition, historical data are also presented to correlate with current data for each site. Since the number of sets of historical data varies between sites, only the maximum, minimum and mean values are presented. The number of sets of historical data reviewed for a given site is indicated by a numerical value inside the parenthesis of the "Historical Data" column. Appendix G is a compilation of analytical data on algae samples collected at 72 geothermal springs. The algae samples were dried, homogenized by grinding, weighed to approximately 1.0 gram, digested with acid and then analyzed for thirty trace metals. For each algae sample, the name of the site, its designated site number and the state in which the geothermal spring is located are also depicted in this table.

Evaluation of Geothermal Fluids Data

A complete breakdown of the geochemical and historical data for this sampling program is depicted in Appendix F. Based on this information, Table 6 is listed to show the trend and the ranges of concentration by state for the major constituents in the analytical data. Since most trace metals are below detection limits and since historical data do not usually contain trace metal analyses, only the cumulative values of the trace metal with concentrations more than 1 mg/l were presented and the predominant species were identified. Because of the wide spread of geochemical data shown for each state, there seems to be no clear-cut pattern of distribution of the geochemical data within or among states. For most of the states sampled, the quality of geothermal fluids varies from better than potable supply water to worse than brackish water. With the exception of California, the median pH values of all geothermal fluids lies between 7.4 to 8.0. In terms of water quality of the geothermal fluid, Idaho and Montana appear to be the best, with constituent concentrations approximating those of surface water supplies. Overall trace metals for these two states are also the lowest found in this study.

Comparison of Data With Historical Trends

Utilizing the information presented in Table 6, as well as that contained in Appendix F, a general comparison with historical data was made. The intent of this comparison is twofold: to observe the correlation or differences of these data and to supplement historical data where analytical information is currently lacking. Before actual comparison, an estimated median value of the historical data for each constitutent within each state was determined. This data, compiled in Appendix F, for each constituent of each site was then compared to the estimated means and ranges (shown in Table 6) of each corresponding constituent from the new data. This process of visual comparison was repeated for all the sites within a given state. Based on these individual comparisons, an overall qualitative assessment was then made to determine the correlation between new data and the historical trend. Table 7 is a summary of this qualitative comparison.

TABLE 6. SUMMARY OF TRW DATA BY STATE

State Const. Measured	Ariz.	Calif.	Colo.	Idaho	Mont.	Nev.
No. Sites Sampled	5	16	10	19	6	29
pH (units)	8.0 - 9.0	2.8 - 9.3	6.6 - 8.6	6.6 - 9.0	7.1 - 8.8	6.8 - 9.8
Temp. (°C)	32 - 72	39 - 154	36 - 73	41 - 84	60 - 78	35 - 93
Na + K (mg/l)	500 - 2,500	19.3 - 6,700	102 - 6,460	9.5 - 510	145 - 330	25 - 1,080
Ca (mg/l)	22 - 105	1.8 - 100	5.6 - 380	2.2 - 93	3.3 - 9.7	1.8 - 170
Mg (mg/l)	8.2 - 38	0.07 - 22	0.3 - 67	0 - 24	0.07 - 3.3	0.11 - 155
SiO_2 (mg/l)	35 - 87	67.5 - 290	27 - 144	72 - 760	81.5 - 126	61 - 430
Cl (mg/l)	355 - 3,000	0 - 10,500	25 - 4,800	3.9 - 850	15 - 140	4.4 - 2,200
SO_4 (mg/l)	48 - 820	7 - 950	36 - 1,000	8 - 680	37 - 97	14 - 720
TDS	1535 - 7395	175 - 22,800	460 - 19,600	160 - 1,400	435 - 1,050	365 - 4,410
Trace Metals (mg/l)	3.8 - 30.6	1.3 - 64.2	1.3 - 173	0 - 13.1	1.07 - 125	1.6 - 27.8
Const. (1 mg/l)						
Predominant Species	Ba,Li	B,Li,Sn Sr	Ba,Al,B Sr	B,Al,Sr	Ag,Sn	B,Sr,Al Ba

Table 6. Summary of TRW Data by State - Continued

State Const. Measured	N.Mex.	Ore.	Utah	Wash.	Wyo.
No. Sites Sampled	8	9	13	3	3
pH (units)	7.0 - 8.4	7.3 - 8.8	6.2 - 8.2	8.2 - 9.8	6.2 - 6.8
Temp (°C)	40 - 82	61 - 88	39 - 80	31.1 - 39.4	54.4 - 67.0
Na + K (mg/l)	123 - 1,080	175 - 980	220 - 13,000	66.2 - 840	190 - 1,250
Ca (mg/l)	22 - 150	14 - 103	66 - 1,200	1.3 - 63	13 - 315
Mg (mg/l)	0.2 - 18	0.07 - 1.9	13 - 250	0.07 - 5.0	1.3 - 73
SlO_2 (mg/l)	32 - 88	90.5 - 225	23 - 180	63 - 114	35.5 - 147.5
Cl (mg/l)	24 - 1,990	122 - 1,240	170 - 2,250	0.1 - 121	120 - 1,720
SO_4 (mg/l)	19 - 95	37 - 820	35 - 1,040	31 - 71	12 - 17
TDS	370 - 3,625	555 - 3,150	1,470 - 39,400	300 - 2,800	700 - 5,560
Trace Metals (mg/l) Const. (1 mg/l)	1.1 - 34.7	2.5 - 134	3.9 - 81.0	1 - 23.0	3.0 - 12.0
Predominant Species	B,Sr,Sn Rb	B,Sn,Sr Li	Sr,B,Ba,Al, Li,Rb	B,Sr	B,Li,Sr, Ln

Table 7. Qualitative Comparison of Historical Data with TRW's Data

STATE CONST. MEASURED	ARIZONA	CALIFORNIA
pH	Generally higher than historical mean by +1	Generally higher than historical mean by 0.5 to 1.0 pH units
Temperature	2 or 4 correlate well with historical mean	Agree well with historical data
Na & K	Agrees with historical data	70% agree well with historical data 12% - 50% deviation 12%-30% deviation (low)
Ca	Agrees with historical data	85% 5-10 mg/l higher than mean
Mg	Agrees with historical data	70% 1.0 mg/l generally data agrees with historical data
SiO_2	Trend 10-20% lower than historical data	70% correlate well 24% deviate by 25% or more with clear trend high
Cl	Deviates above and below historical data (3-5% or more)	75% correlates well
SO_4	1 site agrees well, 1 site low, 2 sites no data	50% agree well, 50% trend low with 50% or more deviation
TDS	Good correlation with historical data at three sites	7 sites good correlation (remaining no historical data)
Trace constituents	Reported Ba higher than historical data by 100% or more in all cases	The high amounts of B, agrees well with historical data

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Table 7. Qualitative Comaprison of Historical Data with TRW's Data

STATE CONST. MEASURED	COLORADO	IDAHO
pH	Trend higher than historical data .5 to 1.0 pH units	Deviates equally high and low with respect to historical mean
Temperature	80% 55-65 trend 2-3% lower than historical data	80% agree well with historical data 20% low
Na & K	Agrees well with historical data	80% agree with historical data
Ca	80% 20 agrees well with historical data	95% agrees with historical data
Mg	50% correlates well 50% deviates with trend higher by 50% or more	Agrees with historical data
SiO_2	Agrees well with historical data	80% agrees well with historical data
Cl	Most agree with historical data	All agree well with historical data
SO_4	40% agree well 60% deviate by 50% or more with definite trend low	60% agree well 40% deviate by 50% or more (no trend)
TDS	Most agree well with historical data	95% agree well with historical data
Trace constitu-	Higher amounts of Ba and Al in TRW data	Low levels of trace constituents (not comparable)

Table 7. Qualitative Comparison of Historical Data with TRW's Data - Continued

STATE CONST. MEASURED	MONTANA	NEVADA
pH	2 cases higher than historical mean	Good agreement with historical data
Temperature	Data correlates within 10% of historical mean	Good agreement with historical data
Na & K	Agrees well with historical mean	70% agree well with historical data
Ca	Slight trend higher than historical mean	70% agree well with historical data
Mg	Agrees well with historical mean	60% agree well with historical data 20% deviates higher than historical man
SiO_2	Agrees well with historical mean	33% agree well with historical data 38% deviate high by volume
Cl	Agrees with historical mean	75% agree well with historical mean
SO_4	Two of three deviate by 50% or more with trend low	Most all agree with historical mean however a slight trend low
TDS	Slight trend lower than historical means	24% agree well with historical data 20% have slight to strong trend higher than mean
Trace constituents	Very low levels to trace constituents (not comparable)	Agree in most cases with historical data

Table 7. Qualitative Comparison of Historical Data with TRW's Data - Continued

STATE CONST. MEASURED	NEW MEXICO	OREGON
pH	50% above and 50% below historical data	Average 2-3 pH units higher than historical data
Temperature	Agrees well with historical mean	6 sites agree well with historical data
Na & K	Agrees well with historical data	All sites agree well with historical data
Ca	6 sites agree well with historical data (2 sites low)	All sites agree well with historical data
Mg	Agrees well with historical data	Agrees well with historical data
SiO_2	Most agree well with historical data	Most sites agree well with historical data
Cl	Good correlation with historical data	Agrees well with historical data
SO_4	Most data agree well with slight trend low	All but one site deviate by 50% or more with definite trend low
TDS	Agree well with historical data	No historical data for comparison
Trace constituents	Most cases near historical mean	Data not comparable

Table 7. Qualitative Comparison of Historical Data with TRW's Data - Continued

STATE CONST. MEASURED	UTAH	WASHINGTON
pH	Agrees with historical data	Not enough data for comparison
Temperature	80% agree with historical data	Not enough data for comparison
Na & K	40% 500 40% agree well with historical data	Not enough data for comparison
Ca	60% agree well with historical data	Not enough data for comparison
Mg	Agrees well with historical data	Good correlation
SiO_2	45% agree well with historical data	Not enough data for comparison
Cl	40% agree well with historical data	Good correlation
SO_4	6 sites agree well 2 sites low by 50% or more	Not enough data for comparison
TDS	50% agree well with historical data	Good correlation
Trace constituents	High amounts of trace constituents	Not enough data for comparison

Table 7. Qualitative Comparison of Historical Data with TRW's Data - Continued

STATE CONST. MEASURED	WYOMING
pH	2 sites low
Temperature	Not enough data for comparison
Na and K	Good correlation
Ca	Good correlation
Mg	Not enough data for comparison
SiO_2	Not enough data for comparison
Cl	Good correlation
SO_4	Not enough data for comparison
TDS	Not enough data for comparison
Trace constituents	Not enough data for comparison

Overall assessment of these data produces the following general conclusions: 1) the new data for most major constituents correlate well with historical data and 2) minor constituents such as trace metals are randomly distributed; there is no direct correlation between the historical and new data. Some non-directional deviations (> 50%) were observed for major constituents. Those constitutents which showed the greatest variation between new and historical data were SiO_2, SO_4, Ba, and B. The possible reasons for some of these variations or inconsistencies are presented at the end of Appendix F. Trace elements were generally not comparable because historical data for the most part were available only on limited constituents and data points.

Evaluation of Algae Analyses

Concurrent with the geothermal fluids sampling and analyses efforts, a number of algae samples were also collected at geothermal springs where there was a prevalent growth. The intent of sampling and analyzing algae was to determine trace constituents in geothermal fluids that were too low in concentration to be detected by current technology. Since algae are known to concentrate trace metals as limiting nutrients for growth, the absence (or below the detection limit) of a specific constituent in an algae sample would be an indication of its absence in the geothermal fluids. Appendix H is a listing of the algae analyses from the 72 geothermal springs. In general, the most abundant species of trace elements found in algae are Fe, Al, Ca, Na, K, and Mg. These are all present in concentrations in the range of thousands of milligrams per kilogram of algae (ppm). The species of trace elements determined to be less than the detection limits are Cs, Se, Sb, Hg, Ti, Tl, Rb and Mo. The elements Li, Be, Cr, V, Co, Ni, Zn, Cd, Cu, Pb and Sn are present in very low concentrations. They are generally less than 100 ppm. The rest of the elements were randomly distributed with concentrations varying from less than detectable to over 100 ppm. In general, the trace elements were so random in concentration that there does not appear to be any pattern in their distribution for a given state.

It is interesting to note, however, that elements that were considered toxic to algae such as Cu, Zn, Cr and As, were found in noticeable concentrations in several algae samples. One possible explanation is that algae have the tendency of absorbing sand and silt which may contain these trace metals dispersed from bottom deposits. Further analysis of these samples, including a silica determination, may be necessary to verify this.

SECTION 5

ERROR ANALYSIS

In the course of this sampling program, several observations have raised concern regarding probable sources of error. These probable sources of error are identified below.

SAMPLING TECHNIQUES

Spring Sampling

The most significant source of error in spring sampling was in the extractions of gas components for analysis. Radon in the non-condensible gases was collected in a 250 ml evacuated flask concurrently with other gases. Prior to the actual counting of radon in the 125 ml Lucas cell, the gas sample in the evacuated flask was scrubbed with zinc acetate ($ZnAc_2$) to remove H_2S, Ascarite to remove CO_2, and Dri-rite to remove moisture. These gaseous components had to be removed because they interferred with radon counting. The effectiveness of gas component removal from the sampling flask is the factor determining the significance of introduced error. Since only 10 ml of aqueous zinc acetate and 40 ml H_2O were used for H_2S absorption, the effective surface for liquid-gas contact (via shaking the mixture) may not be adequate; hence H_2S removal may not have been very effective. Any residual H_2S in the gas stream would interfere with subsequent radon and H_2S determination. A more efficient system would be to use a series (2 to 3) of liquid columns of $ZnAc_2$ to increase surface contact and to insure H_2S removal from the gas stream. For this system to be effective, helium gas may be required as a carrier gas to force the collected non-condensible gas from the evacuated flask through the H_2S absorption columns. At the time of this sampling program, the liquid columns were not available.

The removal of CO_2 and H_2O vapor could be complete if the absorptive capacity of the Ascarite and Dri-rite was not exceeded. The absorptive capacity of an adsorbent such as Ascarite for a given gas or solute can be determined experimentally. Adequate quantities of both absorbents were used to effect removal of the two main gases.

The secondary concern associated with spring sampling is the collection of non-condensible gases in boiling or near boiling springs. The spring sampling equipment was not designed to separate condensible steam from non-condensible gases. Because of this, several boiling springs were not sampled for gaseous components. For any future sampling program involving the collection of non-condensible gases from boiling springs, it is recommended that a sampling system be designed utilizing an inverted funnel connected to a steam-water separator, condensing coil, water trap and a gas collection bulb.

The major source of error in liquid sampling from springs is in locating the most appropriate place for collecting the liquid. All field crew members were directed to sample near the mouth of a spring and away from sources of contamination. In reality, several springs were too large for the field crew to comply with the above guidelines. Because of this constraint, a few of the liquid samples collected may not be completely representative of the natural occurring geothermal fluid.

Well Sampling

The sampling equipment, designed and built for well sampling, integrated the ideas of several researchers. The system could be operated to collect geothermal liquid, steam and non-condensible gases, from a range of high temperature and/or pressure wells. No significant sources of error were noted in both gas and liquid sampling. A minor problem was noted in the control valves for stabilizing the brine and the condensible steam flow. More precisely controlled valves might be required for future well sampling efforts.

ANALYSIS TECHNIQUES

Field Analysis

The major sources of error in field analysis were pressure and temperature corrections for gaseous samples. Most gaseous samples were collected at reduced pressures because of altitude and elevated temperatures. The difference in pressure and temperature values observed in the field was significant when compared to values at standard conditions (29.5 inches of Hg and 70°F). Since pressures are measured in inches of Hg, this pressure differential (if not accounted for) may introduce errors of as much as 27 percent. Similarly, temperature differential of the gas between the field and standard conditions might also introduce error. However, temperatures are reported in absolute values. A difference of 30°F in gas temperature from standard conditions would only result in less than 6 percent error and is, therefore, not considered significant. A barometer that can read pressure in the vicinity of 20 inches of mercury should be employed for pressure correction for high altitude sampling of gaseous components.

Laboratory Analysis

In general, laboratory analysis has the fewest sources of error since all analyses were performed under the most well-controlled conditions. Any identifiable source of error could be readily corrected. Because of this convenience, no major errors were identified. There was a short period in which the atomic absorption spectrophotometer was operating erratically. Analyses performed during this period were re-performed later.

BIBLIOGRAPHY

Rand, M. C., ed. Standard Methods for the Examination of Water and Wastewater. Fourteenth Edition. Washington, D.C., 1976.

Sung, R. D. and D. L. Strehler. "A Sampling Manual for Geothermal Sites." Unpublished Report. TRW Environmental Engineering Division. Redondo Beach, CA, 1979.

Sung, R. D. and L. S. Friedman. "Data Assessment of Geothermal Sites." Unpublished Report. TRW Environmental Engineering Division. Redondo Beach, CA, 1979

APPENDIX A

SPRING SAMPLING PROCEDURE

SPRING SAMPLING PROCEDURE

Unless the geothermal spring is located within a campground, a resort, or a motel, site contacts will not be made since most spring owners are either too remotely located to be contacted or disinterested in sampling activities. Request for permission to sample at campgrounds, resorts, or motels will be made at the time of sampling. The sampling crew will explain the purpose and intent of the program to the owner or operator of the spring. To substantiate the sampling program, a xerox copy of the written sampling plan was made available to the spring owner upon request. TRW did not insist on sampling a spring if the owner had refused to cooperate. In general, spring sampling procedure is relatively simple and will follow a step-by-step procedure as defined below:

- if ground near the spring is soft, lay down wooden plank right by the sampling location for ground support
- set up apparatus as shown in Figure

Gas Sampling

- evacuate funnel to allow liquid to rise to the top of the inverted funnel immediately below the stopcock which is connected to the sampling bulb
- with the stopcock closed, let non-condensible gas build up under the funnel (this is observed by the corresponding displacement of the liquid from the funnel)
- based on flow rate determined by the bubbleometer, estimate time required to collect the non-condensible gases.
- initiate gas collection by opening stopcock on sample bulb (do not let any liquids enter sample bulb only gas)
- gas collection is considered complete when the liquid level in the inverted funnel stops to fluctuate or rise (with stopcock to sample bulb open)
- close stopcock and remove sample bulb

A-1

Water Sampling

- collect liquid sample from spring by lowering a 3-gallon stainless steel vessel into the spring
- to minimize surface aeration, samples must be taken below the surface of spring, preferably at the mouth of spring
- liquid sampling is considered complete when the stainless steel vessel has collected at least 2 1/2 gallons of liquid
- locate a site where there is prevalence of algae bloom, either near a stagnant portion of the spring or from rocks close to the edge of spring
- scrape off approximately 5 gm of algae and place in a labelled petri dish; allow excess water to drain and seal container with tape
- record all pertinent information about the site including a polaroid picture of the spring
- carry all components back to the van. Initiate field analysis (Section 4.3) and sample processing (Section 3.6).

APPENDIX B

WELL SAMPLING PROCEDURE

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WELL SAMPLING PROCEDURE

In general, well sampling will follow a step-by-step procedure as depicted below:

- contact well operator or owner prior to actual sampling to schedule sampling date in advance (obtain name, address and telephone number of the person in charge at the well site).
- verify availability of well two days in advance of sampling.
- contact well operator and request escort to well-head for sampling
- Obtain information on well flow rate, location of well pump, distance and size of pipe from pump to collection point, size of well casing and how long it has been flowing
- set up sampling train near well-head with all valves open
- connect bypass valve from well-head with appropriate adaptors or reducers to 1/4" swage on sampling train (see Figure 3-1).
- close the inlet valve to the sampling train; open the bypass valve slowly on the well-head until completely open
- record pressure and temperature of well from gauge readings
- open the inlet valve to the steam-water separator slowly until a gauge pressure of 5 psig is obtained (be extremely careful that pressure is slowly introduced into the sampling system)
- record temperature reading from thermocouple well
- allow brine to flow through for at least twice the pipe volume from the bottom of the well to the sampling point before actual sampling.
- while waiting, measure flow rates of brine and condensed steam with graduated cylinder and stop watch
- concurrently measure non-condensible gas flow rate with bubbleometer
- record all readings and pour ice into ice baths (two) to cover the stainless steel tubing completely
- after twice the pipe volume of fluids have been flowed, and the sampling flow becomes stabilized, start collecting brine sample and condensed steam in a stainless steel container.

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- record length of time for sample collection (approximately 3 gallons of water is required)
- while liquid collection is taking place, fill gas collection flask with cooled geothermal brine and connect to tail-end of sampling train
- connect gas collection flask to sample train at the overhead tubing from the water trap
- collect gas until all liquid has been displaced
- close valve from gas collection flask
- after all liquid and non-condensible gas have been collected, close bypass valve from well-head
- disconnect sampling train from well-head
- document all pertinent information regarding the site including taking a polaroid picture of the site
- carry all equipment back to van and initiate field analysis (see Section 4.3) and sample processing (see Section 3.6).

APPENDIX C

RADON SAMPLING AND ANALYSIS

RADON SAMPLING PROCEDURE

Cell Cleaning

The Lucas cells must be cleaned of previous sample prior to collection of next sample.

- attach cell to vacuum-purge panal in van
- draw down cell for 10 min.
- purge with nitrogen or high purity air
- repeat cell draw down and purge
- draw down cell for 30 min. to 1 hr.

Cell Background

The Lucas cell's background count must be determined before sampling

- with cell attached to vacuum-purge panal; fill cell to atmospheric pressure with aged high purity air
- place Lucas cell in Ludlam counter and wait 5 min.
- during waiting period check high voltage value (should be 1100 v), also check batteries if the instrument is operating on batteries
- background count the cell for 30 min. and record this valve on the days Radon Data sheet.
- replace cell on vacuum-purge system and draw down for 10-20 min.
- record cell vacuum and barometric pressure at end of draw down period.

Sampling

The Radon sample is obtained from the gas flask which was washed with ZnAs for H_2S determination. After emptying the ZnAs (to be saved for H_2S titration) the gas flask is attached between the purge line and vacuum-purge panal. (See Figure 1).

- attach gas flask to vacuum-purge panal and insert helium purge syringe into septum and attach to helium (helium must be flowing at very low pressure) gas flask vertical with syringe at top

- attach Lucas cell to a gas scrubber tube (Dririte end towards Lucas cell) and scrubber tube to vacuum-purge panal
- draw down system with both the gas flask and cell stopcocks closed but with purge valve open for 5-10 min.
- close vacuum valve on vacuum-purge panal
- open gas flask and cell stopcocks
- monometer should drop and then steadily drop until barometric pressure is reached. Close cell stopcock at this point and remove from vacuum-purge panal.

Counting

The Ludlam counter is used to determine counts.

- set Ludlam counter to 30 min. time and check instrument background
- put Lucas cell in counter and wait 5 min. for stabilization
- during waiting period check high voltage; should be 1100 v.
- count cell for 30 min. if count exceeds 10,000 counting period should be shortened and count repeated. Record counts.

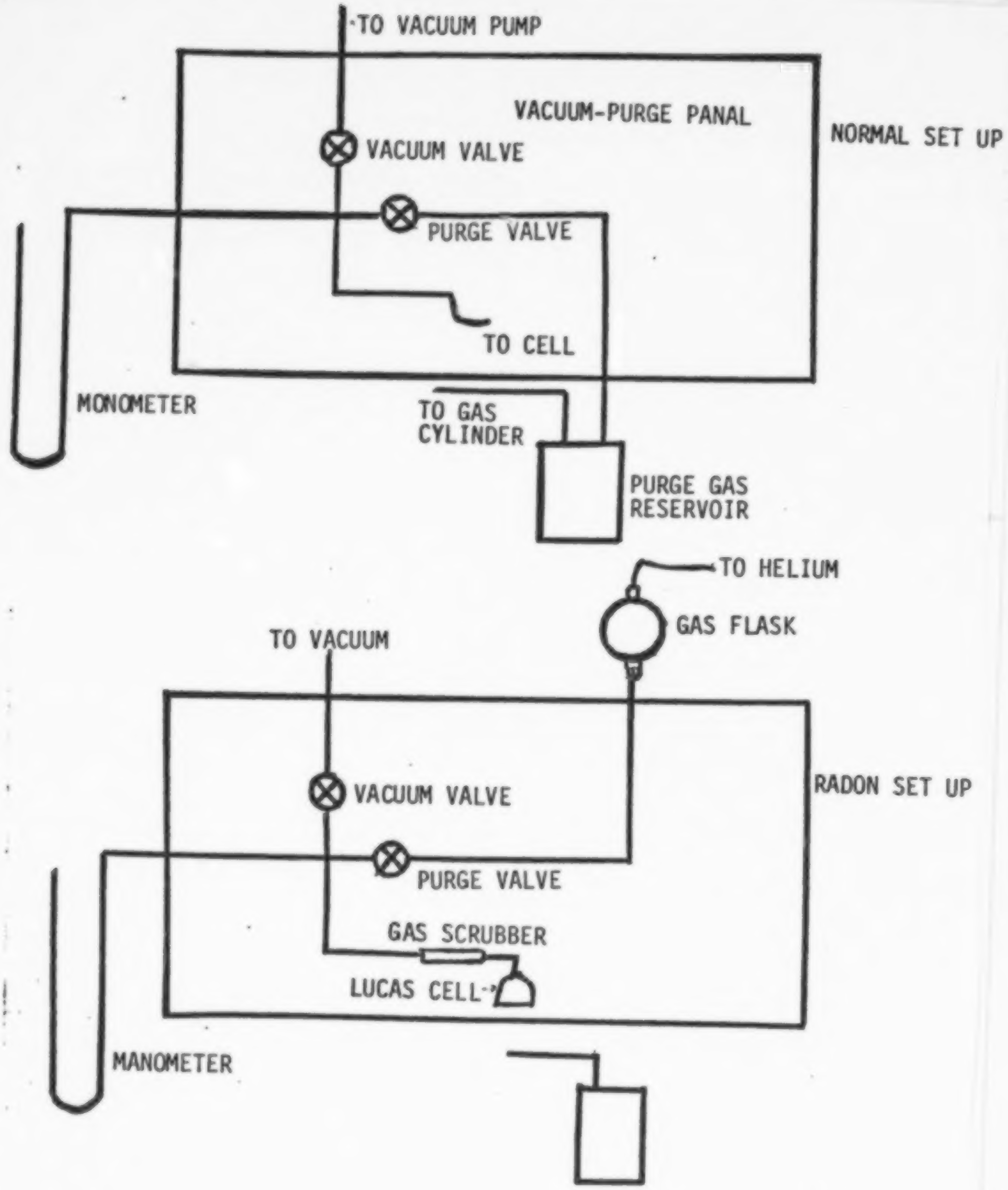
TO VACUUM PUMP
VACUUM-PURGE PANAL
NORMAL SET UP
VACUUM VALVE
PURGE VALVE
TO CELL
MONOMETER
TO GAS CYLINDER
PURGE GAS RESERVOIR
TO HELIUM
GAS FLASK
TO VACUUM
RADON SET UP
VACUUM VALVE
PURGE VALVE
GAS SCRUBBER
LUCAS CELL
MANOMETER

Figure 1. Radon sampling schematic diagram.

APPENDIX D

SULFIDE ANALYSIS

Sulfide Determination by Titration

Reagents:

- ~ 0.8 N zinc acetate
- ~ 1 N sodium hydroxide
- Hydrochloric acid, concentrated
- 0.01 N iodine (standardized against thiosulfate)
- 0.01 N phenylarsine oxide (PAO), standard solution of known normality (standardized against potassium iodide)

Starch solution: Dissolve 1 g soluble starch in 2 ml hot deionized water and dilute to 100 ml with hot deionized water. Add 1 ml chloroform as a preservative.

Procedure:

Prepare a blank of 100 ml deionized water and carry it through the determination with the sample. Pipet a volume of filtered, untreated sample (100 ml maximum) into a 250 ml disposable plastic beaker and adjust the volume to approximately 100 ml with deionized water. Immediately add 1 ml 0.8 N Zn $(C_2H_3O_2)_2$ and then 1 ml 1 N NaOH solution. Swirl the beaker and wait for a precipitate to form. The solution may be kept at this point and run within the next 24 hours. If the temperature of the sample is higher than 25°C, let the sample cool in the open beaker until 25°C is reached (a cold water bath may be used) before continuing the determination. Add 10 ml concentrated HCl followed immediately by 10.0 ml 0.01 N I_2. Place the beaker on the magnetic stirrer and titrate the excess iodine (yellow color) with 0.01 N PAO, adding approximately 1 ml of starch when the color has decreased to a pale yellow color. Continue titrating until the blue starch color has disappeared (this color will return upon standing owing to air oxidation). If no iodine is liberated from the acidified sample (no yellow color), prepare a smaller volume or a dilution of the sample. For calculation of mg/l hydrogen sulfide, record the number of milliliters of sodium thiosulfate used for the sample and for the blank and the normality of the sodium thiosulfate solution.

Calculations:

$$\text{Mg/l } H_2S = \frac{1000}{\text{ml of sample taken}} \times 17.04 \times N\ Na_2S_2O_3 \times \left(\begin{matrix}\text{ml blank}\\ \text{titrant}\end{matrix} - \begin{matrix}\text{ml sample}\\ \text{titrant}\end{matrix}\right)$$

APPENDIX E

OTHER FIELD ANALYSES

FIELD ANALYSIS

pH measurement using pH meter

1. Put pH 7 buffer in cup and immerse cup electrode in water source.
2. When pH reading is steady, use calibrate knob to adjust meter to pH 7.00
3. Rinse cup, add pH 4 buffer and immerse cup electrode in water source.
4. When reading is constant, use temperature knob on pH meter to adjust meter to pH 4.00. The meter is now direct reading at temperatures near 25°C. In any event, record the observed pH of the pH 4 buffer so true pH values may be calculated later.
5. Rinse electrode and immerse in water source.
6. Record pH when reading is steady. The indicated pH of the 4 and 7 buffers and the pH of the water and the temperature are all needed for calculation of the true pH.

For hot springs there should be two pH calibrations, one in the spring (pH of water and two buffers) and one at ambient temperature (pH of water and two buffers, and titration data). The pH of the spring is computed from the high temperature data and the bicarbonate and carbonate from the low temperature data.

Alkalinity Titration

1. Fill buret with standard acid (usually 0.05 N H_2SO_4) for bicarbonate titration.
2. While pH electrode is immersed in water, pipet an aliquot (100 ml) of water into a beaker. Record pH reading.
3. Titrate acid into beaker while stirring until pH 4.0 is reached.
4. Total alkalinity is determined from following equation

$$\text{Total alkalinity (mg/l as } CaCo_3) = \frac{V \text{ acid} \times N \text{ acid} \times 50{,}000}{V \text{ sample}}$$

6-1

G

Conductivity Measurement Using Purity Meter (Barnstead)

The PM-50A may be used as a direct reading purity meter to monitor the purity of the water. Operate the purity meter as follows:

1. Rotate the METER RANGE selector to the BLACK position. If an optional Cell Selector Switch is installed, set the Cell Selector Switch to position 1 or position 2, as desired.
2. If the cell is being used as a dip cell, agitate the cell slightly to ensure that all air is purged from the cell. If the purity is too low to give an accurate indication, rotate the METER RANGE selector to the GREEN (GR) or RED (RD) position. The purity meter has three scale ranges. When the METER RANGE selector is in the BLACK (BL) position, the meter range is 0 to 18 megohms (meter black scale), and the SET POINT selector range is 0 to 18 megohms. When the METER RANGE selector is in the GREEN (GR) position, the meter range is 0 to 1.8 megohms (meter green scale), and the SET POINT selector range is 0 to 1.8 megohms. When the METER RANGE selector is in the RED (RD) position, the meter range is 0 to 0.18 megohms (meter red scale), and the SET POINT selector range is 0 to 0.18 megohms.

APPENDIX F

SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: ARIZONA
SITE NAME: INDIAN HOT SPRINGS
LOCATION - COUNTY Graham TOWNSHIP 6S RANGE 24E
SITE NO. 2 , PRIORITY NO. ALT.

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.95	7.88	7.51	7.64
Cond. (µmhos/cm)				
Temperature (°C)	44	45	48	46.9
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)		70.5	70.5	70.5
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	70.9			
Na	950	1022.6	865	962.5
K	12	13	12	12.6
Ca	77	92.8	76	82.3
Mg	8.5	10.3	8.1	9.2
SiO_2	30	43.45	39	40.8
Cl	2000	1400	1200	1327
SO_4	400	380	350	363.7
PO_4	0.71	0	0	0
TDS	3025	3014	2630	2882.6
SS	1.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.57±0.17	0.79	0.53	0.66
Rn (222)		581	478	530
Th (230)	<0.27	<0.025	<0.025	<0.025
Th (232)	<0.27	<0.0088	<0.0088	<0.0088
U (234)	0.68±0.24	0.812	0.628	0.72
U (238)	0.87±0.43	0.443	0.317	0.38
Pb (210)	1.6±1.2			

	TRW DATA	HISTORICAL DATA (3)		
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)		MAX	MIN	MEAN
Al	<0.50	<0.001	<0.001	<0.001
As	<0.025			
Ba	28	0.70	0.70	0.70
B	0.35	0.62	0.57	
Cd	0.005			
Cr	<0.080			
Cu	0.028	<0.01	<0.01	<0.01
Fe	0.20	<0.1	<0.02	<0.047
Cs	<0.13	<0.1	<0.1	<0.1
Pb	0.064			
Li	1.2	1.3	1.2	1.25
Mn	0.02	<0.02	<0.02	<0.02
Mo	<0.30			
Hg	<0.010	0.0004	0.0001	0.00025
Ag	0.030			
Sr	1.4			
Se	<0.20			
Rb	0.25	0.09	0.07	0.08
Ni	<0.030	<0.02	<0.02	<0.02
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.50			
Sb	<0.080			
Zn	0.038	0.01	<0.01	0.005

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: ARIZONA
SITE NAME: MT. GRAHAM HOT MINERAL BATH
LOCATION - COUNTY Graham TOWNSHIP 7S RANGE 25E
SITE NO. 5 , PRIORITY NO. 3

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.1	7.85	7.58	7.71
Cond. (μmhos/cm)				
Temperature (°C)	44	45	42	43.5
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	59.5			
Na	2500	3027.3	2600	2813.7
K	10	11	10.9	10.95
Ca	105	135.4	110	122.7
Mg	8.2	10	7.9	8.95
SiO_2	50	65.83	55	60.4
Cl	3000	4517.3	3800	4158.6
SO_4	820	787.2	680	733.6
PO_4	0.007	0	0	0
TDS	7395	8292	7430	7864
SS	2.2			
S	1.08			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.69±0.21	1.47	1.13	1.3
Rn (222)		1263	1137	1200
Th (230)	< 0.32	<0.035	<0.035	<0.035
Th (232)	<0.32	<0.019	<0.019	<0.019
U (234)	0.50±0.39	0.281	0.179	0.23
U (238)	<0.21	0.154	0.086	0.12
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.50	<1.1	0.002	0.551
As	<0.025	0.07	0.07	0.07
Ba	7.2	0.37	0.37	0.37
B	1.05	1.65	1.4	1.53
Cd	<0.005			
Cr	<0.080			
Cu	0.063	<0.12	<0.01	<0.065
Fe	0.16	0.24	<0.02	<0.13
Cs	<0.13	<0.1	<0.1	<0.1
Pb	0.14			
Li	2.0	2.77	1.9	2.34
Mn	0.22	0.09	0.09	0.09
Mo	<0.30			
Hg	<0.010	0.0007	0.0003	0.0005
Ag	<0.030	<0.07	<0.07	<0.07
Sr	1.5	1.88	1.88	1.88
Se	<0.20	0.053	0.053	0.053
Rb	0.25	0.07	0.07	0.07
Ni	<0.030	0.04	0.04	0.04
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.50			
Sb	<0.080			
Zn	0.034	0.09	<0.01	0.045

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: ARIZONA
SITE NAME: GILLARD HOT SPRINGS
LOCATION - COUNTY Greenlee TOWNSHIP 5S RANGE 29E
SITE NO. 7 . PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2	7.35	7.3	7.33
Cond. (µmhos/cm)				
Temperature (°C)	72			
Flow (1/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)		70.5	32.3	51.4
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/1)				
Alkalinity (mg/1 as $CaCO_3$)	35.5			
Na	480	450	410.8	430.4
K	17	14	13.2	13.6
Ca	22	22	20	21
Mg	1.8	0.8	0.7	0.75
SiO_2	87	97.72	95	96.36
Cl	499	490	463.6	476.8
SO_4	48			
PO_4	0.16	0	0	0
TDS	1535	1483	1244	1364
SS	3.6			
S	0			
RADIOACTIVITY (in pCi/1)				
Ra (226)	0.10±0.03	0.423	0.237	0.33
Rn (222)		587	493	540
Th (230)	< 0.03	<0.022	<0.022	<0.022
Th (232)	< 0.30	<0.014	<0.014	<0.014
U (234)	0.18±0.11	0.314	0.206	0.26
U (238)	0.26±0.14	0.213	0.127	0.17
Pb (210)	< 1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/1)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.50	<1.1	0.009	0.5545
As	<0.025	0.061	0.061	0.061
Ba	2.8	<0.20	<0.20	<0.20
B	0.05	0.41	0.4	0.405
Cd	<0.005			
Cr	<0.080			
Cu	0.019	<0.12	<0.01	<0.065
Fe	0.06	<0.1	<0.02	<0.06
Cs	<0.13	<0.1	<0.1	<0.1
Pb	<0.030			
Li	1.0	1.01	0.87	0.94
Mn	0.19	<0.02	<0.02	<0.02
Mo	<0.30			
Hg	<0.010	0.0007	0.0002	0.0005
Ag	<0.030	<0.07	<0.07	<0.07
Sr	0.38	0.9	0.9	0.9
Se	<0.20	0.014	0.014	0.014
Rb	0.25	<0.02	<0.02	<0.02
Ni	<0.030	<0.02	<0.02	<0.02
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.50			
Sb	<0.080			
Zn	0.028	0.13	<0.01	0.065

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: ARIZONA
SITE NAME: AQUA CALIENTE
LOCATION - COUNTY Maricopa TOWNSHIP 5S RANGE 10W
SITE NO. 8, PRIORITY NO. 4

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.0	8.1	7.79	7.95
Cond. (μmhos/cm)				
Temperature (°C)	43	38	30.4	34.2
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)		<35.5	<35.5	<35.5
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	13.9			
Na	240	132.6	132.6	132.6
K	2.8	5.5	5.5	5.5
Ca	8.3	26.4	26.4	26.4
Mg	0.25	2.4	2.4	2.4
SiO_2	24.0	58.06	58.06	58.06
Cl	225	25.9	25.9	29.5
SO_4	63	188.3	188.3	188.3
PO_4	0.21	0.02	0.02	0.02
TDS	7900	632	632	632
SS	<0.1			
S	0.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.19±0.06	0.286	0.134	0.21
Rn (222)		159	121	140
Th (230)	<0.29	<0.022	<0.022	<0.022
Th (232)	<0.29	<0.014	<0.014	<0.014
U (234)	0.21±0.10	0.116	0.052	0.084
U (238)	0.29±0.11	0.080	0.032	0.056
Pb (210)	1.6±1.2			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.5	<1.0	<1.0	<1.0
As	<0.025	0.01	0.01	0.01
Ba	3.2	0.20	0.20	0.20
B	2.0	0.12	0.12	0.12
Cd	0.019			
Cr	<0.080			
Cu	0.040	<0.1	<0.1	<0.1
Fe	<0.010	0.27	0.27	0.27
Cs	<0.13			
Pb	<0.030			
Li	0.24	0.35	0.35	0.35
Mn	<0.010			
Mo	<0.30			
Hg	<0.010			
Ag	<0.030	<0.06	<0.06	<0.06
Sr	1.1	0.05	0.05	0.05
Se	<0.20	0.007	0.007	0.007
Rb	<0.13			
Ni	<0.030			
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	0.07			
V	<0.5			
Sb	<0.080			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: ARIZONA
SITE NAME: VERDE HOT SPRINGS
LOCATION - COUNTY Cochise TOWNSHIP 13S RANGE 21E
SITE NO. 140, PRIORITY NO. ALT.

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.1	6.99	6.51	6.75
Cond. (µmhos/cm)				
Temperature (°C)	32	40	36	38
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	142.5			
Na	500	950	933.8	942
K	20	40.3	35	37.5
Ca	82	103.6	110	107
Mg	38	39.5	39	39.2
SiO_2	35	75.24	69	73
Cl	355	550	528.9	535
SO_4	470	560	550.4	555
PO_4	0.11	0.50	0.50	0.50
TDS	1800	3931	3236	3584
SS	3			
S	0.20			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.4±0.4			
Rn (222)				
Th (230)	<0.29			
Th (232)	<0.29			
U (234)	2.2±0.5			
U (238)	0.78±0.28			
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.5	<1.0	0.002	<0.5
As	<0.025	0.051	0.051	0.051
Ba	4.7	0.29	0.29	0.29
B	14.4	8.9	0.44	4.67
Cd	<0.005			
Cr	<0.080			
Cu	<0.010	<0.1	0.01	<0.06
Fe	0.13	0.78	0.02	0.40
Cs	<0.13	<0.1	<0.1	<0.1
Pb	0.037			
Li	0.61	1.33	1.2	1.27
Mn	0.19	0.06	0.06	0.06
Mo	<0.30			
Hg	<0.010	0.0003	0.0002	0.00025
Ag	<0.030	<0.06	<0.06	<0.06
Sr	2.0	3.19	3.19	3.19
Se	<0.20	0.024	0.024	0.024
Rb	<0.13	0.1	0.1	0.1
Ni	0.042	0.02	0.02	0.02
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.5			
Sb	<0.080			
Zn	0.044	0.04	0.02	0.03

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: EAST MESA BUREAU OF RECLAMATION (Well No. 6-1)
LOCATION - COUNTY Imperial TOWNSHIP 16S RANGE 17E
SITE NO. 25, PRIORITY NO. 1

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.5	9.12	5.45	6.93
Cond. (µmhos/cm)				
Temperature (°C)	154	187	95	140.5
Flow (l/min)	6.45			
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)		14	4.5	9.25
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	971.6	560	202	377.6
Na	6100	8100	593	2750.7
K	640	1050	29	324.7
Ca	73	1360	8.5	350.2
Mg	13	17.2	<.05	<4.89
SiO_2	278	389	201	297.7
Cl	10,750	15,850	454	4736.5
SO_4	13	173	42.8	118.4
PO_4	0.037	<.2	<.01	.106
TDS	22800	26,300	1575	8618.7
SS				
S				
RADIOACTIVITY (in pCi/l)				
Ra (226)	9.0±2.7	190	.25	95.125
Rn (222)		1287	1240	1263
Th (230)	<0.39	2.54	.8	1.67
Th (232)	<0.27	<.14	<.1	<.12
U (234)	≤0.20	.12	<.1	<.11
U (238)	≤0.20	<.1	<.1	<.1
Pb (210)	2.4±1.4			

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.50	.03	.02	.025
As	<0.025	.05	.22	.135
Ba	0.27	.25	.15	0.2
B	12.65	7.45	1.6	4.525
Cd	<0.005	<0.1	<0.1	<0.1
Cr	<0.080	<0.1	<0.1	<0.1
Cu	0.11	<.1	<.1	<.1
Fe	5.3	<.1	<.1	<.1
Cs	1.1	.38	.14	.26
Pb	0.12	<.5	<.5	<.5
Li	2.6	4	1.1	2.55
Mn	0.97	.05	<.05	<.05
Mo	<0.30	<.005	<.005	<.005
Hg	<0.010	.01	.002	.006
Ag	0.11	<.01	<.01	<.01
Sr	10	6.4	2.1	4.25
Se	<0.20	.5	<.1	<.3
Rb	5.9			
Ni	<0.030	<.1	<.1	<.1
Sn	<1.0			
Be	<0.010	<.02	<.02	<.02
Ti	<0.5	<.1	<.1	<.1
Tl	0.090			
V	<0.50	<.005	<.005	<.005
Sb	<0.080	1.2	1.2	1.2
Zn	0.059	0.07	<0.01	0.025

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: WENDEL HOT SPRINGS
LOCATION - COUNTY Lassen TOWNSHIP 23N RANGE 16E
SITE NO. 32 , PRIORITY NO. 13

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.85	8.2	8.38	8.28
Cond. (μmhos/cm)				
Temperature (°C)	96	96	87	92.8
Flow (l/min)		1200	1200	1200
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)		.4	.4	.4
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)		2.5	2.5	2.5
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	56.6	53	51	52
Na	255	280	280	280
K	8.2	8	7.5	7.75
Ca	21	20	18	19
Mg	<0.07	<.1	<.1	<.1
SiO_2	157	125	120	122.5
Cl	210	190	185	187.5
SO_4	300	360	340	350
PO_4	0.20			
TDS	1035	1040	1021	1030.5
SS	1.2			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.5±0.4	.084	.084	.084
Rn (222)		410	410	410
Th (230)	<0.28	.61	.61	.61
Th (232)	<0.28	<.1	<.1	<.1
U (234)	<0.16	.08	.06	.08
U (238)	<0.16	.06	.06	.06
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	1.25			
As	0.09			
Ba	0.313			
B	5.2	5.6	5.5	5.55
Cd	0.0003	<.01	<.01	<.01
Cr	0.022			
Cu	0.002	<.02	<.02	<.02
Fe	0.05	<.06	<.06	<.06
Cs	0.07			
Pb	<0.015	<.01	<.01	<.01
Li	0.13	.12	.11	.115
Mn	0.01	<.01	<.01	<.01
Mo	<0.02			
Hg	0.002			
Ag	0.002			
Sr	0.11			
Se	0.05			
Rb		.04	.04	.04
Ni	0.305	<.04	<.04	<.04
Sn	0.07			
Be	0.100			
Ti	0.054			
Tl	<0.03			
[illegible]	<0.05			
Sb	0.005			
Zn	0.012	0.015	0.015	0.015

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE CALIFORNIA
SITE NAME KELLEY HOT SPRINGS
LOCATION - COUNTY Modoc TOWNSHIP 42N RANGE 10E
SITE NO. 36 PRIORITY NO. 12

	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.8	8.08	8.08	8.08
Cond. (umhos/cm)		2770	2770	2770
Temperature (°C)	90	92	90	91
Flow (l/min)		1250	1250	1250
GAS ANALYSIS:				
H_2S (μg/m^3)	839			
CO (ppm)	<100			
CO_2 (ppm)	952			
O_2 (%)	5.2			
NH_3 (μg/m^3)	27			
CH_4 (%)	7.7			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	47.7	46	46	46
Na	205	250	250	250
K	6.5	6.5	6.5	6.5
Ca	22	20	20	20
Mg	< 0.07	<.01	<.01	<.01
SiO_2	129	110	110	110
Cl	183	160	160	160
SO_4	47	300	300	300
PO_4	0.25			
TDS	875	899	899	899
[illegible]	1.2			
N	0.61			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.8±0.5	.29	.29	.29
Rn (222)	1.14*	54	54	54
Th (230)	<0.14	.72	.72	.72
Th (232)	<0.41	<.1	<.1	<.1
U (234)	<0.10	.08	.08	.08
U (238)	≤0.20	.06	.06	.06
Pb (210)	1.7±1.4			

* pCi/m^3

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	0.02			
As	0.06			
Ba	0.02			
B	3.5	3.8	3.8	3.8
Cd	0.0002	<.01	<.01	<.01
Cr	0.007			
Cu	0.004	<.02	<.02	<.02
Fe	<0.005	<.04	<.04	<.04
Cs	0.007			
Pb	<0.015	<.01	<.01	<.01
Li	0.13	.15	.15	.15
Mn	0.01	<.01	<.01	<.01
Mo	<0.02			
Hg	0.003			
Ag	0.002			
Sr	0.34			
Se	0.03			
Rb	0.007	.02	.02	.02
Ni	0.185	<.04	<.04	<.04
Sn	1.67			
Be	2.40			
Ti	0.046			
Tl	0.03			
V	0.05			
Sb	0.010			
Zn	0.028	<0.005	<0.005	<0.005

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: LEONARDS HOT SPRING
LOCATION - COUNTY Modoc TOWNSHIP 43N RANGE 16E
SITE NO. 35 , PRIORITY NO. 16

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2	7.62	7.6	7.71
Cond (µmhos/cm)		2590	2590	2590
Temperature (°C)	60	62	41	54.3
Flow (l/min)		225	150	183.3
GAS ANALYSIS:				
H_2S ($\mu g/m^3$)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 ($\mu g/m^3$)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	74	182	83	132.5
Na	275	403	330	366.5
K	8.5	8.5	5.7	7.1
Ca	28	26	15	20.5
Mg	0.67	3.46	.06	1.76
SiO_2	128.5	110	58.4	84.2
Cl	300	220	218	219
SO_4	31	400	390	395
PO_4	0.28			
TDS	1170	1180	1180	1180
Si	2.8			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.26±0.08	<.045	<.045	<.045
Rn (222)		1700	1700	1700
Th (230)	<0.36	.86	.86	.86
Th (232)	<0.36	<.10	<.10	.10
U (234)	<0.17	.06	.06	.06
U (238)	<0.14	<.10	<.10	<.10
Pb (210)	<1.7			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.02			
As	0.15			
Be	<0.02			
B	7	7.6	7.6	7.6
Cd	0.0008	<.01	<.01	<.01
Cr	0.182			
Cu	0.004	<.02	<.02	<.02
Fe	<0.0005	<.06	<.06	<.06
Cs	<0.07			
Pb	<0.015	<.01	<.01	<.01
Li	0.13	.13	.1	.115
Mn	0.28	.09	.09	.09
Mo	<0.02			
Hg	0.003			
Ag	0.003			
Sr	0.13			
Se	0.03			
Rb	<0.07			
Ni	0.045	.03	.03	.03
Sn	1.25	<.04	<.04	<.04
Be	0.25			
Ti	0.019			
Tl	0.03			
V	0.05			
Sb	0.003			
Zn	0.720	<0.0005	<0.0005	<0.0005

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE CALIFORNIA
SITE NAME SURPRISE VALLEY HOT SPRINGS MOTEL
LOCATION - COUNTY Modoc TOWNSHIP 42N RANGE 17E
SITE NO. 46 , PRIORITY NO. 11

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.0	8.8	8.4	8.6
Cond. (µmhos/cm)				
Temperature (°C)	91	98	86	92
Flow (l/min)		300	100	191.6
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	66.9	124	57	90.35
Na	240	437	280	339.2
K	15	30	5.5	14.4
Ca	18	17	.05	11.01
Mg	< 0.07	< .1	.01	.053
SiO_2	119	182	100	129.2
Cl	242	234	198	213.7
SO_4	400	351	310	327.7
PO_4	0.12	.02	.02	.02
TDS	1226	1310	991	1150.5
NO_3	1.2			
F	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.31±0.09	0.061	0.051	0.056
Rn (222)		26	0	13
Th (230)	< 0.29	1.72	0.86	1.29
Th (232)	< 0.29	< 0.10	< 0.10	< 0.10
U (234)	≤ 0.05	0.06	0.02	0.04
U (238)	≤ 0.05	0.10	0.10	0.10
Pb (210)	< 1.7			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	< 0.50			
As	< 0.025	0.36	0.36	0.36
Ba	0.36	0.11	0.11	0.11
B	9.2	5.7	6.0	5.8
Cd	< 0.005	< 0.01	0.001	0.005
Cr	< 0.080	0.005	0.005	0.005
Cu	0.034	< 0.02	0.001	0.01
Fe	0.10	< 0.06	0.048	0.054
Cs	0.5			
Pb	< 0.030	< 0.1	0.0006	< 0.05
Li	0.09	0.5	0.08	0.29
Mn	0.17	0.01	< 0.01	0.01
Mo	< 0.30			
Hg	< 0.010	0.00002	0.00002	0.00002
Ag	0.034	< 0.01	0.01	0.01
Sr	6.9			
Se	< 0.20			
Rb	2.2			
Ni	0.030	< 0.04	0.0001	< 0.02
Sn	< 1.0			
Be	< 0.010			
Ti	< 0.5			
Tl	< 0.040			
V	< 0.50			
Sb	< 0.080			
Zn	0.007	0.014	0.001	0.007

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: FALES HOT SPRINGS
LOCATION - COUNTY: Mone TOWNSHIP 6N RANGE 24E
SITE NO. 42, PRIORITY NO. 18

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS				
pH	7.2	6.55	6.0	6.275
Cond. (µmhos/cm)				
Temperature (°C)	58	61	60	60.5
Flow (l/min)		1000	1000	1000
GAS ANALYSIS				
H_2S (µg/m^3)	50	<1*	<1*	<1*
CO (mg/m^3)	<116			
CO_2 (%)	52.8	92	92	92
O_2 (%)	10.4	1.1	1.1	1.1
NH_3 (µg/m^3)	33	.22	.22	.22
CH_4 (mg/m^3)	<66	<.1**	<.1**	<.1**
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	846.2			
Na	500	560	560	560
K	35	37	37	37
Ca	40	41	41	41
Mg	10	10	10	10
SiO_2	136	114	114	114
Cl	195	160	160	160
SO_4	41	260	260	260
PO_4	0.53			
TDS	1640	2356	2356	2356
[illegible]	1.2			
[illegible]	0.136			
RADIOACTIVITY (in pCi/l)				
Ra (226)	22±7	30	30	30
Rn (222)	2.74***	750	750	750
Th (230)	< 0.29	1.75	1.75	1.75
Th (232)	< 0.29	<.17	<.17	<.17
U (234)	1.7±0.4	1.93	1.93	1.93
U (238)	0.71±0.22	.8	.8	.8
Pb (210)	< 1.7			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.02	<.001	<.001	<.001
As	0.29			
Ba	<0.02			
B	8.6	8.2	8.2	8.2
Cd	0.0003			
Cr	0.028			
Cu	0.009	.05	.05	.05
Fe	<0.005	.02	.02	.02
Cs	0.13			
Pb	<0.015			
Li	1.2	1.3	1.3	1.3
Mn	0.35	.18	.18	.18
Mo	<0.02			
Hg	0.002	.0001	.0001	.0001
Ag	0.002			
Sr	1.22			
Se	0.15			
Rb	0.29	0.22	0.22	0.22
Ni	0.167	<0.02	<0.02	<0.02
Sn	2.08	<.02	<.02	<.02
Be	0.25			
[illegible]	0.045			
[illegible]	<0.03			
V	<0.05			
Sb	0.016			
Zn	0.030	0.09	0.09	0.09

* ppm
** % by volume
*** pCi/m^3

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: COSO HOT SPRINGS DOE/U.S. NAVY
LOCATION - COUNTY Inyo TOWNSHIP 22S RANGE 38E
SITE NO. 142, PRIORITY NO. 9

	TRW DATA	HISTORICAL DATA (11)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	2.8	9.8	1.2	5.56
Cond. (μmhos/cm)				
Temperature (°C)	74	141	26	95
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	-572.2	218.2	0	94.04
Na	85	2606	14	753
K	10	244	8.6	74.9
Ca	93	359	17	80.7
Mg	22	81	.5	16.56
SiO_2	*	411	27	205.5
Cl	0.1	3681	1	1444.5
SO_4	950	2308	38	761.8
PO_4	0.33	.66	0	.287
TDS	2385	6894	443	3385.8
SS	8.8			
S	0.476			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.1±0.3			
Rn (222)				
Th (230)	< 0.41			
Th (232)	< 0.41			
U (234)	1.7±0.3			
U (238)	1.2±0.3			
Pb (210)	<1.7			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (11)		
		MAX	MIN	MEAN
Al	14.47	201	.11	44.06
As	<0.01	7.5	0	2.11
Ba	0.938			
B	< 0.05	71.6	.11	37.62
Cd	0.004			
Cr	0.056			
Cu	0.80	0	0	0
Fe	3.0	122	.06	30.99
Cs	< 0.07			
Pb	<0.015			
Li	0.07			
Mn	1.7	.1	0.0	.05
Mo	<0.02	0.004	0.004	0.004
Hg	0.003	1.7		
Ag	0.0002	1.4	0	0.7
Sr	0.84			
Se	0.17			
Rb	0.31			
Ni	0.200			
Sn	2.92			
Be	<0.002			
Ti	<0.08			
Tl	<0.03			
[illegible]	<0.05			
Sb	0.008			
Zn	0.952			

* too much iron interfered with analysis

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: MORGAN HOT SPRINGS
LOCATION - COUNTY Tehama TOWNSHIP 29N RANGE 4E
SITE NO. 145. PRIORITY NO. 19

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2			
Cond. (µmhos/cm)				
Temperature (°C)	93.3			
Flow (l/min)	.	95	1.6	48.3
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	60.92	52	52	52
Na	**1200**	1398	1398	1398
K	**77**	196	196	196
Ca	**87**	79	79	79
Mg	**0.10**			
SiO_2	290	233	233	233
Cl	**2400**	2430	2430	2430
SO_4	**47**	79	79	79
PO_4	**0.23**			
TDS	4885			
SS	**0.4**			
S	2.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.67±0.20**			
Rn (222)				
Th (230)	**<0.49**			
Th (232)	**<0.28**			
U (234)	**≤0.25**			
U (238)	**≤0.19**			
Pb (210)	**≤1.7**			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	6.0			
Ba	<0.02			
B	37.2			
Cd	0.0004			
Cr	0.091			
Cu	0.002			
Fe	**<0.005**			
Cs	**0.21**			
Pb	<0.015			
Li	**2.3**			
Mn	**0.021**			
Mo	<0.02			
Hg	0.006			
Ag	0.001			
Sn	1.02			
Se	0.21			
Rb	**0.30**			
Ni	0.046			
Sr	1.25			
Be	0.033			
Ti	<0.08			
Tl	0.061			
V	0.067			
Sb	0.668			
Zn	0.025			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: LONG VALLEY - CASA DIABLO (HOT CREEK)
LOCATION - COUNTY Mono TOWNSHIP 3S RANGE 28E
SITE NO. 143 . PRIORITY NO. 15

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.6	6.6	6.5	6.55
Cond. (μmhos/cm)		**1950**	**1630**	**1790**
Temperature (°C)	82.2	99	79	89.3
Flow (l/min)		400	280	340
GAS ANALYSIS:				
H_2S **(ppm)**	N/A	14	2.3	8.15
CO (mg/m^3)				
CO_2 (%)		**92.7**	88.8	**90.8**
O_2 (%)				
NH_3 **(ppm)**		.4	.1	.25
CH_4 **(%)**		.3	.1	.2
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	445.4	735.3	573	654.1
Na	**335**	410	306	372.6
K	**23**	32	24	26.6
Ca	**4.7**	50	1.6	18.5
Mg	**0.10**	.6	.1	.35
SiO_2	167	200	110	153.3
Cl	**215**	227	200	217.3
SO_4	**<20**	100	96	97.3
PO_4	**0.7**	.15	.15	.15
TDS	1225	1260	1260	1260
SS	**48**			
S	0.986			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.38+0.11**	2.6	2.6	2.6
Rn (222)		470	470	470
Th (230)	**< 0.29**			
Th (232)	**< 0.29**			
U (234)	**≤ 0.06**			
U (238)	**< 0.06**			
Pb (210)	**< 1.7**			

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	0.71	.06	.006	.033
As	6.0	.74	.2	.47
Ba	<0.02			
B	1.7	11	10.5	10.7
Cd	0.0003	<.01	<.01	<.01
Cr	0.033			
Cu	0.006	.07	.02	.045
Fe	**0.042**	.15	<.05	<0.1
Cs	**0.21**			
Pb	<0.015	<.1	<.1	<.1
Li	**2.3**	3	2.3	2.7
Mn	**0.048**	.24	<.02	<.13
Mo	<0.02			
Hg	0.003	.0013	<.0001	<.0007
Ag	0.0008	<.04	<.04	<.04
Sr	0.31	.6	.6	.6
Se	0.09	.005	.005	.005
Rb	**0.30**	.26	.26	.26
Ni	0.257	.1	<.05	<.075
Sn	0.84			
Be	0.033			
Ti	<0.08			
Tl	<0.03			
V	<0.05			
Sb	0.156	<.1	<.1	<.1
Zn	0.010			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: CALISTOGA HOT SPRINGS
LOCATION - COUNTY Napa TOWNSHIP 9N RANGE 6W
SITE NO. 147, PRIORITY NO. 10

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2			
Cond. (µmhos/cm)				
Temperature (°C)	76	98.9	98.9	98.9
Flow (l/min)		1965	1965	1965
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	33.92	.52	.52	.52
Na	**160**	193	193	193
K	**7.8**	8.8	8.8	8.8
Ca	**7.7**	4.5	4.5	4.5
Mg	**0.17**	0	0	0
SiO_2	134	139	139	139
Cl	**202**	215	215	215
SO_4	12	12	12	12
PO_4	**0.65**			
TDS	7835			
SS	**55.6**			
S	0.476			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.16±0.05**			
Rn (222)				
Th (230)	**< 0.30**			
Th (232)	**< 0.30**			
U (234)	**≤ 0.05**			
U (238)	**≤ 0.05**			
Pb (210)	**< 1.7**			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	0.03			
Ba	<0.02			
B	9.6	9.2	9.2	9.2
Cd	0.0005			
Cr	0.034			
Cu	0.002			
Fe	**0.014**			
Cs	**0.43**			
Pb	<0.015			
Li	**1.9**	2.1	2.1	2.1
Mn	**0.038**			
Mo	<0.02			
Hg	0.005			
Ag	<0.001			
Sr	0.72			
Se	0.03			
Rb	**0.14**			
Ni	0.100			
Sn	1.25			
Be	0.017			
Ti	0.019			
Tl	<0.03			
V	0.067			
Sb	0.190			
Zn	0.014			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: SKAGGS'S HOT SPRINGS
LOCATION - COUNTY Sonoma TOWNSHIP 10N RANGE 11W
SITE NO. 148, PRIORITY NO. 21

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.0	7.2	7.2	7.2
Cond. (μmhos/cm)				
Temperature (°C)	57	55.6	55.6	55.6
Flow (l/min)		15	15	15
GAS ANALYSIS:				
H_2S (μg/m^3)	401			
CO (mg/m^3)	<116			
CO_2 (%)	46.1			
O_2 (%)	4.9			
NH_3 (μg/m^3)	11			
CH_4 (%)	6.8			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1995	2470	2470	2470
Na	820	945	945	945
K	28	29	29	29
Ca	16	14	14	14
Mg	4.7	4.5	4.5	4.5
SiO_2	129	124	124	124
Cl	78	54	54	54
SO_4	12	5	5	5
PO_4	0.81			
TDS	2800			
SS	121			
S	0.068			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.91±0.27			
Rn (222)	.645*			
Th (230)	<0.43			
Th (232)	<0.30			
U (234)	<0.12			
U (238)	<0.12			
Pb (210)	<1.7			

* pCi/m^3

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	0.01			
Ba	2.15			
B	23.3	90	90	90
Cd	0.0005			
Cr	0.750			
Cu	0.011			
Fe	0.015			
Cs	<0.07			
Pb	<0.015			
Li	0.54			
Mn	0.03			
Mo	<0.02			
Hg	0.004			
Ag	<0.001			
Sr	0.74			
Se	0.15			
Rb	0.19			
Ni	0.111			
Sn	1.25			
Be	0.100			
Ti	<0.08			
Tl	<0.03			
V	<0.05			
Sb	0.022			
Zn	0.037			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: REDS MEADOW HOT SPRINGS
LOCATION - COUNTY Madera TOWNSHIP 4S RANGE 26E
SITE NO. 149, PRIORITY NO. 22

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.3	7.29	7.29	7.29
Cond. (µmhos/cm)				
Temperature (°C)	48	45.5	45.5	45.5
Flow (l/min)		50	50	50
GAS ANALYSIS:				
H_2S **(ppm)**	N/A	<.5	<.5	<.5
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 **(mg/l)**		<.1	<.1	<.1
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	394.1	516	516	516
Na	120	140	140	140
K	6.3	6.2	6.2	6.2
Ca	73	61	61	61
Mg	2.3	2.5	2.5	2.5
SiO_2	149	150	150	150
Cl	0.0	6.7	6.7	6.7
SO_4	33			
PO_4	0.68			
TDS	730	923	923	923
SS	0.8			
S	0.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.20±0.06			
Rn (222)				
Th (230)	0.34			
Th (232)	0.34			
U (234)	2.5±.05			
U (238)	1.8±0.4			
Pb (210)	<1.7			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.02	.001	.001	.001
As	0.24			
Ba	0.75			
B	1.6	1.8	1.8	1.8
Cd	0.0004			
Cr	0.170			
Cu	0.004	<.01	<.01	<.01
Fe	0.021	<.02	<.02	<.02
Cs	< 0.07			
Pb	<0.015			
Li	0.84	.83	.83	.83
Mn	0.81	.54	.54	.54
Mo	<0.02			
Hg	0.004	.0002	.0002	.0002
Ag	<0.001			
Sr	0.5			
Se	0.02			
Rb	0.08	<.02	<.02	<.02
Ni	0.197	<.02	<.02	<.02
Sn	2.25			
Be	0.15			
Ti	<0.08			
Tl	<0.03			
V	<0.05			
Sb	0.008			
Zn	0.094			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: WARNER HOT SPRINGS (LAS CALIENTES)
LOCATION - COUNTY San Diego TOWNSHIP 10. ANGE 3E
SITE NO. 153, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.3	9.8	9.8	9.8
Cond. (µmhos/cm)				
Temperature (°C)	57			
Flow (l/min)				
GAS ANALYSIS				
H_2S (µg/m^3)	50			
CO (mg/m^3)	<116			
CO_2 (%)	0.10			
H_2 (%)	7.5			
NH_3 (µg/m^3)	6.1			
CH_4 (mg/m^3)	12600			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	21.1	55	55	55
Na	100	97	97	97
K	2.8	1	1	1
Ca	1.8	.4	.4	.4
Mg	0.1	.2	.2	.2
SiO_2	122	107	107	107
Cl	26.5	19	19	19
SO_4	44	.4	.4	.4
PO_4	0.0025			
TDS	365			
SS	0.2			
S	14.95			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.09±0.03			
Rn (222)	3.75*			
Th (230)	<0.32			
Th (232)	<0.32			
U (234)	0.13±0.08			
U (238)	0.39±0.14			
Pb (210)	<1.7			

* pCi/m^3

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.50			
As	<0.025			
Ba	1.3			
B	0.05	.9	.9	.9
Cd	<0.005			
Cr	<0.080			
Cu	<0.010			
Fe	0.06			
Cs	<0.13			
Pb	<0.030			
Li	0.13			
Mn	<0.010			
Mo	<0.30			
Hg	<0.010			
Ag	<0.030			
Sr	<0.094			
Se	<0.20			
Rb	<0.13			
Ni	<0.030			
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.50			
Sb	<0.080			
Zn	0.041			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: SUSANVILLE-BUREAU OF RECLAMATION
LOCATION - COUNTY Lassen TOWNSHIP ___ RANGE ___
SITE NO. 213 , PRIORITY NO. 8

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.4			
Cond. (µmhos/cm)				
Temperature (°C)	39			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)				
CO (mg/m^3)	N/A			
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	109.34			
Na	15			
K	4.3			
Ca	24			
Mg	3.0			
SiO_2	67.5			
Cl	0.0			
SO_4	7			
PO_4	0.32			
TDS	175			
SS	0.4			
S	0.238			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.10±0.03			
Rn (222) (in pCi/m^3)				
Th (230)	<0.27			
Th (232)	<0.27			
U (234)	0.68±0.27			
U (238)	0.20+0.14			
Pb (210)	2.4±1.3			

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	<0.01			
Ba	0.313			
B	<0.05			
Cd	0.0004			
Cr	0.059			
Cu	0.001			
Fe	<0.005			
Cs	<0.07			
Pb	<0.015			
Li	0.09			
Mn	0.005			
Mo	<0.02			
Hg	0.005			
Ag	0.002			
Sr	0.55			
Se	0.03			
Rb	0.08			
Ni	0.177			
Sn	1.67			
Be	<0.002			
Ti	<0.08			
Tl	<0.03			
[illegible]	<0.05			
Sb	0.014			
Zn	0.084			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: AMEDEE HOT SPRINGS
LOCATION - COUNTY Lassen TOWNSHIP 28N RANGE 16E
SITE NO. 253, PRIORITY NO. 17

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.0	8.43	8.2	8.34
Cond. (μmhos/cm)				
Temperature (°C)	91	95	87	91.3
Flow (l/min)		1900	1900	1900
GAS ANALYSIS:				
H_2S (μg/m³)	251			
CO (mg/m³)	<100			
CO_2 (%)	1.4	1.1	1.1	1.1
O_2 (%)	5.6			
NH_3 (μg/m³)	100			
CH_4 (mg/m³)	4.8*	6.7	6.7	6.7
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	53.28	48	46	47
Na	200	250	235	242.5
K	6.0	6	6	6
Ca	19	16	14	15
Mg	<0.07	<.1	<.1	.1
SiO_2	128	100	95	97.5
Cl	155	160	160	160
SO_4	44	300	290	295
PO_4	0.25			
TDS	995	879	863	871
SS	2.8			
S				
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.92±0.28	.084	.084	.084
Rn (222)	1.84***	410	410	410
Th (230)	≤ 0.34	.61	.61	.61
Th (232)	≤ 0.34	<.10	<.10	<.10
U (234)	≤ 0.05	.08	.08	.08
U (238)	≤ 0.05	.06	.06	.06
Pb (210)	1.3±1.1			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.02			
As	0.11			
Ba	0.313			
B	3.7	4	3.8	3.9
Cd	0.0006	<.01	<.01	<.01
Cr	0.059			
Cu	0.002	<.02	<.02	<.02
Fe	<0.005	<.06	<.06	<.06
Cs	<0.07			
Pb	<0.015	<.01	<.01	<.01
Li	<0.05	.08	.08	.08
Mn	0.011	<.01	<.01	<.01
Mo	<0.02			
Hg	0.005			
Ag	<0.001			
Sr	0.65			
Se	0.08			
Rb	<0.07	.02	.02	.02
Ni	0.028	<.04	<.04	<.04
Sn	3.14			
Be	<0.002			
Ti	<0.08			
Tl	<0.03			
V	<0.05			
Sb	0.029			
Zn	0.025			

* ppm
** pCi/m³

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: CALIFORNIA
SITE NAME: EAST MESA MEGMA
LOCATION - COUNTY: Imperial TOWNSHIP ____ RANGE ____
SITE NO. 254, PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.9			
Cond. (umhos/cm)				
Temperature (°C)	119			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	1151			
CO (mg/m³)	<116			
CO_2 (%)	40.2			
O_2 (%)	9.8			
NH_3 (μg/m³)	5			
CH_4 (mg/m³)	45100			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	46.46			
Na	3000			
K	280			
Ca	100			
Mg	2.9			
SiO_2	244			
Cl	640			
SO_4	45			
PO_4	0.25			
TDS	13725			
NO_3	12			
S	<0.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	12±4			
Rn (222) (in pCi/m³)	51.2			
Th (230)	≤0.29			
Th (232)	≤0.29			
U (234)	≤0.17			
U (238)	≤0.17			
Pb (210)	1.9±1.2			

	TRW DATA	HISTORICAL DATA		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.50			
As	<0.025			
Ba	36			
B	9.0			
Cd	<0.005			
Cr	<0.06			
Cu	0.034			
Fe	0.10			
Cs	0.50			
Pb	<0.03			
Li	10.0			
Mn	0.17			
Mo	<0.30			
Hg	<0.01			
Ag	0.034			
Sr	6.9			
Se	<0.20			
Rb	2.2			
Ni	0.03			
Sn	<1.0			
Be	<0.01			
Ti	<0.5			
Tl	<0.04			
V	<0.50			
W	<0.08			
Zn	0.056			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: COTTONWOOD HOT SPRINGS
LOCATION - COUNTY Chaffee TOWNSHIP 14S RANGE 79W
SITE NO. 45 . PRIORITY NO. 9

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.6	8.5	6.0	7.77
Cond. (umhos/cm)		547	500	524
Temperature (°C)	50	54	50	52.4
Flow (1/min)		340	190	240
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	70.4	138	110	131.2
Na	100	110	100	105
K	2.6	2.7	2.6	2.6
Ca	5.6	6.4	5.6	5.9
Mg	0.25	.6	0	.3
SiO_2	54	58	13	45.7
Cl	25.0	32	28	30
SO_4	75	110	110	110
PO_4	0.225	.12	0	.037
TDS	460	368	302	347.5
SS	5.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.25+0.08	.68	.68	.68
Rn (222)		250	250	250
Th (230)	<0.34	<.014	<.014	<.014
Th (232)	<0.23	<.014	<.014	<.014
U (234)	0.62±0.18	.24	.24	.24
U (238)	0.68±0.18	.18	.18	.18
Pb (210)	<1.2			

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	81			
As	0.050	.005	.004	.0045
Ba	92			
B	0.65	.11	.08	.09
Cd	<0.060	0	0	
Cr	<0.030			
Cu	<0.060			
Fe	0.01	.001	0	.0005
Cs	<0.13			
Pb	<0.030			
Li	<0.15	.16	.15	.155
Mn	<0.01	.001	0	.0005
Mo	<0.10			
Hg	<0.010	0	0	0
Ag	<0.060			
Sr	0.59			
Se	<0.20	0	0	0
Rb	<0.13			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.5			
Sb	<0.080			
Zn	0.14	0.02	0.01	0.015

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE COLORADO
SITE NAME PONCHA HOT SPRINGS
LOCATION - COUNTY Chaffee TOWNSHIP 49N RANGE 8E
SITE NO. 47 , PRIORITY NO. 4

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.05	8.0	7.5	7.7
Cond. (μmhos/cm)		1040	870	975
Temperature (°C)	65	71	50	65
Flow (l/min)		760	760	760
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	187.5	399	368	389
Na	180	200	190	195
K	7.0	8.7	8.0	8.2
Ca	16	20	17	17.7
Mg	0.45	.7	.2	.4
SiO_2	67	100	71	82
Cl	62.0	51	49	49.7
SO_4	44	220	190	205
PO_4	0.01	.15	.06	.105
TDS	665	697	667	674
SS	8.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.75±0.23			
Rn (222) (in pCi/m^3)				
Th (230)	<0.27			
Th (232)	<0.27			
U (234)	0.14±0.08			
U (238)	0.08±0.06			
Pb (210)	<1.2			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	.16			
As	<0.025	.003	.002	.0025
Ba	1.3			
B	<0.05	.08	.06	.0725
Cd	<0.002	0	0	0
Cr	<0.030			
Cu	<0.060			
Fe	0.48			
Cs	<0.13			
Pb	<0.030			
Li	0.16	.19	.18	.185
Mn	0.03	.05	.03	.04
Mo	<0.10			
Hg	<0.010	.0001	0	.00005
Ag	<0.060			
Sr	0.42			
Se	<0.20	0	0	0
Rb	0.25			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.080			
Zn	0.041	0.01	0.01	0.01

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: GLENWOOD (YAMPA/BIG SPRINGS)
LOCATION - COUNTY Garfield TOWNSHIP 6S RANGE 89W
SITE NO. 52, PRIORITY NO. 6

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.6	6.5	6.3	6.4
Cond. (µmhos/cm)		36,600	30,000	32,000
Temperature (°C)	49	51	50	50.4
Flow (l/min)		610	530	570
GAS ANALYSIS:				
H_2S (µg/m³)	652			
CO (mg/m³)	<116			
CO_2 (%)	32.1			
O_2 (%)	9.3			
NH_3 (µg/m³)	4			
CH_4 (mg/m³)	<66			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	636.6	**1416**	**1406**	**1410**
Na	6300	7000	6600	6675
K	160	380	170	227.5
Ca	380	530	480	505
Mg	65	90	15	68.7
SiO_2	57	32	29	30.2
Cl	4800	11,000	10,000	10,750
SO_4	1000	1100	1100	1100
PO_4	0.12	.18	.09	.142
TDS	19,600	20,500	18,800	19,950
SS	25.0			
S	2.21			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**26±8**	.083	.083	.083
Rn (222)	**.865***	140	140	140
Th (230)	**<0.16**	.023	.023	.023
Th (232)	**<0.16**	<.018	<.018	<.018
U (234)	**0.55±0.35**	.11	.11	.11
U (238)	**< 0.16**	.078	.078	.078
Pb (210)	**<1.2**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	9.1			
As	<0.025	.001	.001	.001
Ba	6.6			
B	1.7	.92	.87	.89
Cd	<0.003	0	0	0
Cr	<0.030			
Cu	0.094			
Fe	0.14	.15	.02	.057
Cs	0.06			
Pb	0.11			
Li	0.58	.5	.51	.555
Mn	0.034	.09	.06	.075
Mo	<0.10			
Hg	<0.010	0	0	0
Ag	<0.060			
Sr	6.0			
Se	<0.20	0	0	0
Rb	0.53			
Ni	0.046			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	0.77			
V	<0.3			
Sb	<0.080			
Zn	0.031	0.02	0.01	0.015

* In pCi/m³ (gas stream)

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: HOT SULFUR SPRINGS
LOCATION - COUNTY Grand TOWNSHIP 1N RANGE 78W
SITE NO. 53 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (4) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.3	7.7	6.6	7.04
Cond. (μmhos/cm)		1930	1600	1887
Temperature (°C)	65	79	44	51
Flow (l/min)		50	47	48.5
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	673.3	1529	1480	1500.2
Na	420	450	420	435
K	19	25	23	23.5
Ca	15	15	14	14.7
Mg	7.2	3.9	3.2	3.6
SiO_2	27	35	31	32.5
Cl	170	140	120	132.5
SO_4	48	140	120	132
PO_4	0.0575	.09	.03	.045
TDS	1170	1220	1160	1197.5
SS	1.0			
S	3.94			
RADIOACTIVITY (in pCi/l)				
Ra (226)	2.8±0.8	3.2	3.2	3.2
Rn (222)		510	510	510
Th (230)	<0.22	<0.0069	<0.0069	<0.0069
Th (232)	<0.22	<0.0085	<0.0085	<0.0085
U (234)	0.09±0.07	0.057	0.057	0.057
U (238)	0.06±0.05	0.041	0.041	0.041
Pb (210)	<1.2			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4) MAX	MIN	MEAN
Al	1.3			
As	0.040	.006	.005	.0055
Ba	0.39			
B	0.75	.570	.480	.5425
Cd	<0.003	0	0	0
Cr	<0.030			
Cu	0.064			
Fe	0.086	.01	.06	.035
Cs	0.06			
Pb	<0.030			
Li	0.93	1.5	1.1	1.3
Mn	0.056	.09	.07	.077
Mo	<0.10			
Hg	<0.010	0	0	0
Ag	<0.060			
Sr	0.35			
Se	<0.20	0	0	0
Rb	0.16			
Ni	0.018			
Sb	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
[illegible]	<0.010			
Zn	0.034			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: WAUNITA HOT SPRINGS (TOMICH)
LOCATION - COUNTY Gunnison TOWNSHIP 49N RANGE 4E
SITE NO. 54 , PRIORITY NO. 5

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.5	8.5	7.7	8.1
Cond. (µmhos/cm)		796	720	759.5
Temperature (°C)	73	80	77	78.2
Flow (l/min)		215	118	176
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
H_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	106.92	242	232	236
Na	150	160	150	155
K	9.0	10	9.8	9.95
Ca	6.0	11	5.8	8.4
Mg	0.3	7.3	0	.95
SiO_2	144.5	140	110	120
Cl	15.5	16	15	15.2
SO_4	56	190	180	185
PO_4	0.18	0.15	0.03	0.095
TDS	605	613	557	581
SS	6.0			
S	0.718			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.09±0.27**	0.083	0.083	0.083
Rn (222)		140	140	140
Th (230)	**<0.16**	<0.018	<0.018	<0.018
Th (232)	**<0.16**	<0.035	<0.035	<0.035
U (234)	**0.17±0.09**	<0.074	<0.074	<0.074
U (238)	**0.09±0.07**	<0.052	<0.052	<0.052
Pb (210)	**<1.2**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	68			
As	0.025	.002	0	.001
Ba	16			
B	0.55	.07	.06	.0625
Cd	0.011	0	0	0
Cr	0.030			
Cu	<0.20			
Fe	0.02	.04	.01	.0225
Cs	<0.12			
Pb	<0.03			
Li	1.6	.22	.2	.21
Mn	<0.01	.01	.005	.00375
Mo	<0.10			
Hg	<0.010	0	0	0
Ag	<0.2			
Sr	0.47			
Se	<0.20	0	0	0
Rb	0.28			
Sb	<0.015			
Sn	<1.0			
Be	0.016			
Ti	<0.5			
Tl	<0.040			
V	<0.5			
Co	<0.080			
Zn	0.14	0	0	0

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: WAGON WHEEL GAP (4 UR RANCH)
LOCATION - COUNTY Mineral TOWNSHIP 40N RANGE 1E
SITE NO. 55 , PRIORITY NO. 10

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.95	6.6	6.6	6.6
Cond. (umhos/cm)				
Temperature (°C)	53	56	56	56
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)	<116			
CO_2 (%)	29.6			
O_2 (%)	14.9			
NH_3 (µg/m^3)	1			
CH_4 (mg/m^3)	<66			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	671.66			
Na	450			
K	42			
Ca	62			
Mg	15			
SiO_2	79.5			
Cl	255			
SO_4	59			
PO_4	0.0375			
TDS	1700			
SS	1.2			
S	1.39			
RADIOACTIVITY (in pCi/l)				
Ra (226)	3.7±1.1	3.6	3.6	3.6
Rn (222)	.175*	72	72	72
Th (230)	<0.48	<.018	<.018	<.018
Th (232)	<0.48	<.035	<.035	<.035
U (234)	0.17±0.07	<.074	<.074	<.074
U (238)	0.10±0.06	<.052	<.052	<.052
Pb (210)	<1.4			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	52			
As	<0.025			
Ba	12			
B	3.24			
Cd	<0.003			
Cr	<0.030			
Cu	<0.060			
Fe	0.05			
Cs	<0.13			
Pb	<0.030			
Li	1.9			
Mn	0.20			
Mo	<0.10			
Hg	0.27			
Ag	<0.060			
Sr	0.9			
Se	<0.20			
Rb	0.44			
Ni	<0.075			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.5			
Sb	<0.060			
Zn	0.044			

* in pCi/m^3

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: ROUTT HOT SPRINGS
LOCATION - COUNTY: Routt TOWNSHIP 7N RANGE 84W
SITE NO. 57 , PRIORITY NO. 8

	TRW DATA	HISTORICAL DATA (4) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.2	9.3	6.5	7.74
Cond. (µmhos/cm)		1000	610	887.5
Temperature (°C)	61	64.5	64	64.1
Flow (l/min)		50	25	35.7
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	113.7	251	240	251
Na	160	160	160	160
K	6.6	9	8.3	8.65
Ca	7.8	13	7.1	8.9
Mg	4.2	.4	.1	.2
SiO_2	88	97	80	88
Cl	135	140	120	132.5
SO_4	36	54	45	49
PO_4	<0.077	.15	.03	.09
TDS	530	552	518	529.5
[illegible]	3.0			
[illegible]	2.04			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.04	.13	.13	.13
Rn (222)		530	530	530
Th (230)	<0.25	.019	.019	.019
Th (232)	<0.25	.026	.026	.026
U (234)	≤0.09	.039	.039	.039
U (238)	≤0.09	.034	.034	.034
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4) MAX	MIN	MEAN
Al	11.0			
As	<0.025	0.085	0.036	0.062
Ba	0.20			
B	1.6	0.29	0.26	0.28
Cd	<0.003	0.0	0.0	0.0
Cr	<0.030			
Cu	0.079			
Fe	<0.030	0.11	0.0	0.04
Cs	0.04			
Pb	<0.030			
Li	0.21	0.42	0.29	0.36
Mn	<0.010	0.01	0.0	0.005
Mo	<0.10			
Hg	<0.010	0.0	0.0	0.0
Ag	<0.060			
Sr	0.16			
Se	<0.20	0.0	0.0	0.0
Rb	0.09			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
[illegible]	<0.04			
V	<0.30			
Sb	<0.060			
Zn	0.063	0.01	0.0	0.005

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: STEAMBOAT SPRINGS
LOCATION - COUNTY: Routt TOWNSHIP 6N RANGE 84W
SITE NO. 56, PRIORITY NO. 2

	Tm DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS				
pH	8.4	8.0	7.8	7.9
Cond. (μmhos/cm)		1450	1450	1450
Temperature (°C)	36.67	39.5	39	39.25
Flow (l/min)		140	140	140
GAS ANALYSIS				
H_2S (μg/m³)	461			
[illegible] (mg/m³)	<116			
CO_2 (%)	0.16			
[illegible] (%)	11.9			
NH_3 (μg/m³)	6			
CH_4 (mg/m³)	530			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	173.5	167	167	167
Na	300	300	300	300
K	9.0	11	11	11
Ca	17	18	18	18
Mg	4.6	1.0	1.0	1.0
SiO_2	51	49	49	49
Cl	340	320	320	320
SO_4	59	150	150	150
PO_4	.075	.06	.06	.06
TDS	910	963	963	963
[illegible]	7.0			
[illegible]	143			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.46±0.14	1.8	1.8	1.8
Rn (222)	.346	150	150	150
Th (230)	<0.19	<.01	<.01	<.01
Th (232)	<0.19	<.0047	<.0047	<.0047
U (234)	0.19±0.10	.084	.084	.084
U (238)	0.14±0.09	.044	.044	.044
Pb (210)	≤1.4			

* pCi/m³

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	Tm DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	8.7			
As	<0.025	.005	.005	.005
Ba	0.94			
B	0.4	.7	.7	.7
Cd	<0.003	0	0	0
Cr	<0.030			
Cu	<0.060			
Fe	0.056	.04	.04	.04
[illegible]	0.05			
Pb	<0.030			
Li	0.33	.35	.35	.35
Mn	<0.015	0	0	0
Mo	0.10			
Hg	<0.015	0	0	0
Ni	<0.060			
Sr	0.92			
Se	<0.20	0	0	0
Ag	0.10			
[illegible]	<0.015			
[illegible]	<1.0			
[illegible]	<0.015			
[illegible]	<0.5			
[illegible]	<0.040			
[illegible]	<0.030			
[illegible]	<0.060			
Zn	0.044			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: MINERAL (CHAMBERLAIN) HOT SPRINGS
LOCATION - COUNTY Saguache TOWNSHIP 45N RANGE 9E
SITE NO. 40 , PRIORITY NO. 1

	TAW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.6	7.0	6.4	6.7
Cond. (μmhos/cm)		1020	970	990
Temperature (°C)	58	60	60	60
Flow (l/min)		167	71	108
GAS ANALYSIS:				
[illegible]	[illegible]			
[illegible]				
[illegible]				
[illegible]				
[illegible]				
[illegible]				
CHEMICAL ANALYSIS MAJOR CONSTITUENTS (in mg/l):				
Alkalinity (mg/l as CaCO$_3$)	264.3	641	61[illegible]	625
Na	130	140	130	137.5
K	17	15	14	14.25
Ca	53	60	57	58.2
Mg	14	14	13	13.25
SiO$_2$	42	48	45	46.75
Cl	49.0	41	37	39
SO$_4$	63	180	150	167.5
PO$_4$	0.01	0.12	0	0.06
TDS	630	663	639	650
[illegible]	12.0			
[illegible]	0.646			
RADIOACTIVITY (in pCi/l)				
Ra (226)		3.6	3.6	3.6
Rn (222)		2100	2100	2100
Th (230)		.12	.12	.12
Th (232)		.027	.027	.027
U (234)		.089	.089	.089
U (238)		.033	.033	.033
Pb (210)				

CHEMICAL ANALYSIS TRACE CONSTITUENTS (in mg/l)	TAW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	4			
As	<0.125	[illegible]	.028	[illegible]
Ba	[illegible]	.45	.35	[illegible]
B	[illegible]	0.45	0.35	0.39
Cd	<[illegible]	[illegible]	[illegible]	[illegible]
Cr	<[illegible]			
Cu	<0.060			
Fe	[illegible]	.27	.15	[illegible]
Cs	<[illegible]			
Pb	<0.030			
Li	[illegible]	[illegible]	[illegible]	[illegible]
Mn	[illegible]	[illegible]	[illegible]	[illegible]
Mo	<0.30			
Hg	<[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.14			
[illegible]	2.2			
Se	<0.20	[illegible]	[illegible]	[illegible]
[illegible]	0.45			
[illegible]	<0.035			
[illegible]	<1.0			
[illegible]	<0.015			
Ti	<0.5			
[illegible]	<0.04			
V	<0.5			
[illegible]	<[illegible]			
Zn	0.044			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: COLORADO
SITE NAME: IDAHO HOT SPRINGS (LODGE WELL)
LOCATION - COUNTY: Clear Creek TOWNSHIP 3S RANGE 73W
SITE NO. 176 , PRIORITY NO. ALT

	TMW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.9	6.9	6.7	6.8
Cond. (µmhos/cm)				
Temperature (°C)	44	42	40	41.2
Flow (l/min)		79.5	79.5	79.5
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
SO_2 [illegible]				
[illegible]				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1108	2770	2520	2645
Na	430	510	490	505
K	56	84	71	77.7
Ca	110	150	130	137.5
Mg	33	.04	.034	.0365
NO_3				
Cl	70.0	66	64	65.5
SO_4	38	430	380	397.5
PO_4	0.90	.34	.08	.1675
TDS	1880	2116	1940	2005
Si	9.0			
F	0.44			
RADIOACTIVITY (in pCi/l)				
Ra (226)	7.2±2.2			
Rn (222)				
Th (230)	<0.27			
Th (232)	<0.18			
U (234)	0.91±0.25			
U (238)	0.57+0.20			
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TMW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	.34			
As	<0.025	.02	.019	.0195
Ba	.12			
B	<0.05	.41		.37
Cd	<0.003	.001	0	.0005
Cr	<0.030			
Cu	<0.060			
Fe	0.59	.11	.01	.0525
Cs	<0.13			
Pb	<0.030			
Li	0.52	.9	.64	.77
Mn	0.06	.07	.04	.0563
Mo	<0.10			
Hg	0.076	.0002	0	.0001
Ag	<0.060			
Br	.24			
Se	<0.20	0	0	0
Rb	0.56			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.5			
Sb	<0.080			
Zn	0.056			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: CONDIE HOT SPRINGS
LOCATION - COUNTY Blaine TOWNSHIP 1S RANGE 13E
SITE NO. 61, PRIORITY NO. 14

	TMW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	7.3	7.3	7.3
Cond. (umhos/cm)		653	653	653
Temperature (°C)	50	52	52	52
Flow (l/min)		1310	1310	1310
GAS ANALYSIS				
H_2S [illegible]	150			
CO [illegible]	<716			
CO_2 [illegible]	3.7			
N_2 [illegible]	32.6			
NH_3 [illegible]				
CH_4 [illegible]	6630			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS) (in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	288.7	360	360	360
Na	65	63	63	63
K	19	17	17	17
Ca	59	56	56	56
Mg	11	11	11	11
SiO_2	26.0	28	28	28
Cl	15.0	14	14	14
SO_4	14	28	28	28
NO_3	0.0625	.03	.03	.03
TDS	400	396	396	396
[illegible]	5.8			
[illegible]	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	4.4±1.3	.44	.44	.44
Rn (222)				
Th (228)	<0.16	<.006	<.006	<.006
Th (230)	<0.16	<.0063	<.0063	<.0063
U (234)	<0.07	.084	.084	.084
U (238)	<0.07	.016	.016	.016
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS) (in mg/l)	TMW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	0.3			
As	0.08			
Ba	0.38			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	<0.06			
Fe	0.172			
[illegible]	<0.07			
[illegible]	<0.03			
[illegible]	0.19			
Mn	0.013			
Mo	<0.10			
[illegible]	<0.004			
Ag	<0.05			
[illegible]	0.83			
[illegible]	<0.050			
[illegible]	1.36			
[illegible]	<0.015			
[illegible]	<1.0			
[illegible]	<0.015			
[illegible]	<0.5			
[illegible]	<0.04			
[illegible]	<0.3			
[illegible]	<0.01			
Zn	0.013			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: RAFT RIVER
LOCATION - COUNTY: Cassia TOWNSHIP 15S RANGE 26E
SITE NO. 63, PRIORITY NO. 1

	TAW DATA	HISTORICAL DATA (5) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	7.7	7.4	7.6
Cond. (µmhos/cm)		11000	3050	6710
Temperature (°C)	N/A	136	66	96
Flow (l/min)		227	220	223
GAS ANALYSIS				
[illegible]	570			
[illegible]	<100			
[illegible]	6.4			
[illegible]	11.4			
[illegible]		1.6 ppm	1.4 ppm	[illegible] ppm
[illegible]	726			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS) (in mg/l)				
Alkalinity (mg/l as CaCO$_3$)	37.59	55	38	45.1
Na	471	1200	195	766
K	31	100	22	47
Ca	50	209	37	97
Mg	0.10	0.5	0.32	1.4
SiO$_2$	151	159	83.7	111
Cl	850	2330	644	1340
SO$_4$	40	61	57	59
NO$_3$	0.04	0.2	1	0.08
TDS	1690	3360	1341	2051
[illegible]	1.6			
[illegible]	1.02			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.7±0.5	0.61	0.61	0.61
Rn (222)	22.33*	390	390	390
Th (230)	<0.17	0.65	0.65	0.65
Th (232)	<0.17	<0.18	<0.18	<0.18
U (234)	<0.18	0.08	0.08	0.08
U (238)	<0.08	<0.1	<0.1	<0.1
Pb (210)	<1.4			

* pCi/m^3

CHEMICAL ANALYSIS (TRACE CONSTITUENTS) (in mg/l)	TAW DATA	HISTORICAL DATA (5) MAX	MIN	MEAN
Al	<0.02			
As	<0.02	[illegible]	[illegible]	[illegible]
Ba	<0.02	2	<0.4	[illegible]
B	0.05	2	2	2
Cd	0.0004	<0.01	<0.01	<0.01
Cr	0.022			
Cu	0.001	[illegible]	[illegible]	[illegible]
Fe	.037	0.4	<0.2	[illegible]
[illegible]	[illegible]			
[illegible]	<0.015	<0.06	<0.06	<0.06
[illegible]	1.6	[illegible]	1.02	[illegible]
Mn	0.034	[illegible]	[illegible]	[illegible]
[illegible]	<0.02			
[illegible]	0.001	[illegible]	[illegible]	[illegible]
[illegible]	0.0002	[illegible]	[illegible]	[illegible]
[illegible]	1.60	7	[illegible]	[illegible]
[illegible]	0.42			
[illegible]	[illegible]			
[illegible]	0.037	[illegible]	<0.05	[illegible]
[illegible]	10.1			
[illegible]	0.007	[illegible]	[illegible]	[illegible]
[illegible]	<0.06			
[illegible]	0.053			
[illegible]	0.067			
[illegible]	0.003			
Zn	0.021			

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STATE: IDAHO
SITE NAME: SUNBEAM HOT SPRINGS
LOCATION - COUNTY Custer TOWNSHIP 11N RANGE 15E
SITE NO. 64 , PRIORITY NO. 11

	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.9	8.5	8.5	8.5
Cond. (µmhos/cm)		413	409	411
Temperature (°C)	76.8	76	76	76
Flow (l/min)		1680	757	1220
GAS ANALYSIS:				
H_2S (mg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (g/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	106.9	119	119	119
Na	65	65	85	85
K	1.5	2.4	2.4	2.4
Ca	1.9	1.5	1.5	1.5
Mg	<0.15	0	0	0
SiO_2	98.0	91	91	91
Cl	11.0	12	12	12
SO_4	29	54	54	54
PO_4	0.075	.02	.02	.02
TDS	320	320	320	320
SS	4.0			
S	9.93			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.09	.19	.19	.19
Rn (222)				
Th (230)	<0.17	<.012	<.012	<.012
Th (232)	<0.17	.0087	.0087	.0087
U (234)	0.14±0.11	.018	.018	.018
U (238)	<0.13	<.013	<.013	<.013
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.3			
As	<0.05			
Ba	<0.10			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	<0.05			
Fe	0.039			
Cs	<0.07			
Pb	<0.03			
Li	0.09			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
Sr	0.10			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	<0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: BRUNEAU-GRANDVIEW AREA
LOCATION - COUNTY Owyhee TOWNSHIP 6S RANGE 4E
SITE NO. 162, PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.5	8.9	8.9	8.9
Cond. (μmhos/cm)				
Temperature (°C)	45			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	108.5	108	108	108
Na	55	25	25	25
K	6.5	6.4	6.4	6.4
Ca	6.6	6.8	6.8	6.8
Mg	0.47			
SiO_2	76.0	100	100	100
Cl	7.3	11	11	11
SO_4	8	29	29	29
PO_4	0.12			
TDS	240			
SS	0.4			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.15±0.04			
Rn (222)				
Th (230)	<0.07			
Th (232)	<0.07			
U (234)	0.34±0.13			
U (238)	0.22±0.10			
Pb (210)	<1.4			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.3			
As	0.16			
Ba	0.15			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	<0.05			
Fe	<0.030			
Cs	<0.07			
Pb	<0.03			
Li	<0.07			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
Sr	0.05			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	0.02			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: CRANE CREEK HOT SPRINGS
LOCATION - COUNTY Washington TOWNSHIP 11 RANGE 3W
SITE NO. 163 , PRIORITY NO. 3

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS				
pH	7.6	7.1	7.1	7.1
Cond. (µmhos/cm)				
Temperature (°C)	71.1			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	82.6	190	190	190
Na	280	290	290	290
K	18	19	19	19
Ca	27	26	26	26
Mg	0.78			
SiO_2	192	180	180	180
Cl	220	300	300	300
SO_4	470	250	250	250
PO_4	0.12			
TDS	1190			
SS	21.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.47±0.14			
Rn (222)				
Th (230)	<0.11			
Th (232)	<0.16			
U (234)	<0.08			
U (238)	<0.06			
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	7.3			
As	<0.05			
Ba	0.15			
B	8.75			
Cd	<0.003			
Cr	<0.03			
Cu	0.21			
Fe	<0.030			
Cs	0.10			
Pb	<0.01			
Li	0.60			
Mn	0.027			
Mo	<0.10			
Hg	<0.004			
Ag	<0.050			
Sr	0.45			
Se	<0.05			
Rb	0.15			
Ni	0.024			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.3			
[illegible]	0.016			
Zn	0.033			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: WEISER HOT SPRINGS
LOCATION - COUNTY Washington TOWNSHIP 1N RANGE 6W
SITE NO. 164, PRIORITY NO. 5

	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.0	9.3	9.3	9.3
Cond (μmhos/cm)				
Temperature (°C)	60			
Flow (l/min)				
GAS ANALYSIS				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	170.1	35	35	35
Na	155	140	140	140
K	5.2	5	5	5
Ca	3.4	2.9	2.9	2.9
Mg	<0.60			
SiO_2	127	140	140	140
Cl	61.0	56	56	56
SO_4	56	150	150	150
PO_4	0.0475			
TDS	600			
SS	0.6			
S	14.11			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.28±0.08			
Rn (222)				
Th (230)	<0.13			
Th (232)	<0.07			
U (234)	≤0.05			
U (238)	≤0.05			
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
Al	7.7			
As	<0.05			
Ba	0.15			
B	1.75			
Cd	<0.003			
Cr	<0.03			
Cu	0.19			
Fe	<0.03			
[illegible]	<0.07			
Pb	<0.03			
Li	<0.45			
Mn	<0.01			
Mo	<0.10			
Hg	0.004			
Ag	<0.050			
Sr	0.05			
Se	0.05			
Rb	0.07			
Ni	0.015			
Sn	<1.0			
Be	0.015			
Ti	<0.5			
[illegible]	0.04			
V	0.3			
[illegible]	0.01			
Zn	0.038			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: VINCENT HOT SPRINGS (SQUAW)
LOCATION - COUNTY: Franklin TOWNSHIP 15S RANGE 39E
SITE NO. 165 , PRIORITY NO. 6

	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8			
Cond. (µmhos/cm)		18,500		
Temperature (°C)	65.5	[illegible]	82	82
Flow (l/min)		681	681	681
GAS ANALYSIS:				
H_2S (mg/m^3)	150			
CO (mg/m^3)	<100			
CO_2 (%)	0.29			
O_2 (%)	20.6			
NH_3 (mg/m^3)	7			
CH_4 (mg/m^3)	<100			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	366.9			
Na	3500			
K	97			
Ca	240			
Mg	22			
SiO_2	141			
Cl	7400			
SO_4	14			
PO_4	< 0.1			
TDS	15,006			
SS	17.2			
[illegible]	10.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	19±6			
Rn (222) (in pCi/m^3)	$1.44 \cdot 10^4$			
Th (230)	<0.07			
Th (232)	<0.07			
U (234)	≤0.15			
U (238)	≤0.07			
Pb (210)	<1.4			

	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	0.01			
Ba	3.39			
B	3.7			
Cd	0.0004			
Cr	0.097			
Cu	0.016			
Fe	< 0.03			
Cs	0.28			
Pb	0.02			
Li	4.3			
Mn	0.055			
Mo	<0.02			
Hg	0.006			
Ag	0.002			
Sr	4.0			
Se	4.2			
Rb	5.1			
Ni	0.219			
Sn	<0.07			
Be	0.050			
Ti	0.026			
[illegible]	<0.03			
[illegible]	0.005			
Sb	0.033			
Zn	0.023			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: STARKEY HOT SPRINGS
LOCATION - COUNTY Adams TOWNSHIP 16N RANGE 1W
SITE NO. 167, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.0	6.6	6.6	6.6
Cond. (μmhos/cm)		502	502	502
Temperature (°C)	56	56	56	56
Flow (l/min)		492	492	492
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	43.7	66	66	66
Na	100	66	66	66
K	1.4	1.6	1.6	1.6
Ca	4.7	4.5	4.5	4.5
Mg	<0.15	0	0	0
SiO_2	57.0			
Cl	14.0	14	14	14
SO_4	63	150	150	150
PO_4	0.42	.03	.03	.03
TDS	400	369	369	369
[illegible]	0.0			
[illegible]	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.57±0.17			
Rn (222) (in pCi/m³)				
Th (230)	<0.08			
Th (232)	<0.08			
U (234)	<0.08			
U (238)	<0.08			
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
Al	<0.3			
As	<0.05			
Ba	<0.10			
B	5.9			
Cd	<0.003			
Cr	<0.03			
Cu	<0.05			
Fe	<0.030			
Li	<0.07			
Pb	<0.03			
[illegible]	<0.07			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
[illegible]	0.05			
Se	<0.05			
[illegible]	<0.07			
Ni	<0.015			
Sn	<1.0			
[illegible]	<0.015			
[illegible]	<0.5			
[illegible]	<0.04			
[illegible]	<0.3			
[illegible]	<0.01			
Zn	<0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE IDAHO
SITE NAME RIGGINS
LOCATION - COUNTY Idaho TOWNSHIP 24N RANGE 2E
SITE NO. 169. PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.0	8.6	8.6	8.6
Cond. (μmhos/cm)		812	812	812
Temperature (°C)	41	50	42	46
Flow (l/min)		190	190	190
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	53.4	36	36	36
Na	165	160	160	160
K	3.1	3.4	3.4	3.4
Ca	6.6	6.2	6.2	6.2
Mg	<0.15	.1	.1	.1
SiO_2	71.5	72	72	72
Cl	7.1	8	8	8
SO_4	166	300	300	300
PO_4	0.625	.02	.02	.02
TDS	625	582	582	582
SS	4.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.04±0.03			
Rn (222)				
Th (230)	<0.10			
Th (232)	<0.10			
U (234)	<0.12			
U (238)	<0.12			
Pb (210)	<1.4			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	7.1			
As	<0.05			
Ba	<0.10			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	0.24			
Fe	<0.030			
Cs	<0.07			
Pb	<0.03			
Li	<0.07			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.050			
Sr	0.40			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	0.04			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: VULCAN HOT SPRINGS
LOCATION - COUNTY Valley TOWNSHIP 14N RANGE 6E
SITE NO. 170. PRIORITY NO. 7

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.7	8.5	8.5	8.5
Cond. (μmhos/cm)		451	340	395.5
Temperature (°C)	82.2	89	87	88
Flow (l/min)		1890	1700	1800
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	111.8	320	320	320
Na	95.0	94	94	94
K	2.9	3	3	3
Ca	2.2	1.8	1.8	1.8
Mg	<0.15	.1	.1	.1
SiO_2	110			
Cl	13.5	17	17	17
SO_4	26	43	43	43
PO_4	0.12	.02	.02	.02
TDS	350	365	365	365
SS	1.2			
S	2.89			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.08			
Rn (222)				
Th (230)	<0.31			
Th (232)	<0.31			
U (234)	<0.05			
U (238)	<0.05			
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.3			
As	0.06			
Ba	0.10			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	0.05			
Fe	<0.030			
Cs	<0.07			
Pb	<0.03			
Li	<0.10			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
Sr	0.15			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.50			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	<0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: NORTHEAST BOISE THERMAL AREA
LOCATION - COUNTY Ada TOWNSHIP 3N RANGE 2E
SITE NO. 171, PRIORITY NO. 4

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.7	9.0	9.0	9.0
Cond. (µmhos/cm)				
Temperature (°C)	48	80	80	80
Flow (l/min)				
GAS ANALYSIS:				
H_2S (ppm)	N/A	<.1	<.1	<.1
CO (mg/m³)				
CO_2		.2	.2	.2
O_2				
NH_3 (mg/m³)				
CH_4 (ppm)		.07	.07	.07
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	116.6	74	74	74
Na	70	90	90	90
K	0.70	1.6	1.6	1.6
Ca	1.9	1.7	1.7	1.7
Mg	0.19	.05	.05	.05
SiO_2	37.0	160	160	160
Cl	3.9	10	10	10
SO_4	38	23	23	23
PO_4	0.35			
TDS	195	290	290	290
SS	0.6			
S	1.02			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.36±0.11			
Rn (222)				
Th (230)	<0.41			
Th (232)	<0.23			
U (234)	0.10±0.08			
U (238)	0.07±0.06			
Pb (210)	<1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.3			
As	<0.05	<.05	<.05	<.05
Ba	0.15	<.2	<.2	<.2
B	<0.05	.14	.14	.14
Cd	<0.003			
Cr	<0.03	--	--	--
Cu	<0.05	.08	.08	.08
Fe	0.14	.13	.13	.13
Cs	<0.07			
Pb	<0.03	tr	tr	tr
Li	<0.07	.05	.05	.05
Mn	<0.010	.01	.01	.01
Mo	<0.10			
Hg	<0.004	<.02	<.02	<.02
Ni	<0.05			
[illegible]	<0.025	<.01	<.01	<.01
Se	<0.05			
Rb	<0.07			
Si	<0.015	tr	tr	tr
Sn	<1.0			
Be	<0.015			
Ti	<0.5	tr	tr	tr
Tl	<0.04			
V	<0.3			
[illegible]	<0.01			
Zn	<0.007			

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TABLE 6 (Continued)

SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: MURPHY HOT SPRINGS
LOCATION - COUNTY Owyhee TOWNSHIP 16S RANGE 9E
SITE NO. 220, PRIORITY NO. ALT

	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.4	7.1	7.1	7.1
Cond. (μmhos/cm)		137	137	137
Temperature (°C)	54	51	50	50.5
Flow (l/min)		265	265	265
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	63.2	66	66	66
Na	28	30	30	30
K	1.4	2	2	2
Ca	1.3	.6	.6	.6
Mg	< 0.15	0	0	0
SiO_2	84.0	83	83	83
Cl	1.65	2.3	2.3	2.3
SO_4	11	4.7	4.7	4.7
PO_4	0.0875	.1	.1	.1
TDS	160	163	163	163
SS	2.0			
S	0.68			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.05+0.03			
Rn (222)				
Th (230)	< 0.43			
Th (232)	< 0.25			
U (234)	≤ 0.15			
U (238)	≤ 0.15			
Pb (210)	< 1.4			

	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	< 0.3			
As	< 0.05			
Ba	< 0.10			
B	< 0.05			
Cd	< 0.003			
Cr	< 0.03			
Cu	< 0.05			
Fe	< 0.030			
Cs	< 0.07			
Pb	< 0.03			
Li	< 0.07			
Mn	< 0.030			
Mo	< 0.10			
Hg	< 0.004			
Ag	< 0.05			
Sr	< 0.025			
Se	< 0.05			
Rb	< 0.07			
Ni	< 0.015			
Sn	< 1.0			
Be	< 0.015			
Ti	< 0.5			
Tl	< 0.04			
V	< 0.3			
Sb	< 0.01			
Zn	< 0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: BOILING SPRINGS
LOCATION - COUNTY Valley TOWNSHIP 12N RANGE 5E
SITE NO. 221, PRIORITY NO. 6

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.8	8.8	8.8	8.8
Cond. (μmhos/cm)		331	325	328
Temperature (°C)	84			
Flow (l/min)		625	570	597
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	103.6	106	105	106
Na	80	71	71	71
K	1.5	1.7	1.7	1.7
Ca	1.0	1.9	1.9	1.9
Mg	< 0.15	.1	.1	.1
SiO_2	79.0	94	94	94
Cl	9.0	12	12	12
SO_4	14	12	12	12
PO_4	0.25	.02	.02	.02
TDS	265	270	270	270
SS	6.0			
F	0.75			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.10±0.03			
Rn (222)				
Th (230)	< 0.17			
Th (232)	<0.17			
U (234)	<0.17			
U (238)	<0.10			
Pb (210)	< 1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.3			
As	<0.05			
Ba	<0.10			
B	<0.05			
Cd	< 0.003			
Cr	< 0.03			
Cu	< 0.05			
Fe	< 0.030			
Cs	< 0.07			
Pb	< 0.03			
Li	< 0.06			
Mn	< 0.010			
Mo	< 0.10			
Hg	< 0.004			
Ni	<0.05			
Sr	< 0.075			
Se	< 0.05			
Rb	< 0.07			
Ag	<0.015			
Sn	<1.0			
Be	< 0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	< 0.01			
Zn	<0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: MAPLE GROVE HOT SPRINGS
LOCATION - COUNTY Franklin TOWNSHIP 13S RANGE 41E
SITE NO. 223 , PRIORITY NO. 12

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.9	7.3	7.3	7.3
Cond. (umhos/cm)		3160	3110	3135
Temperature (°C)	56	77	76	76.5
Flow (l/min)		1325	1325	1325
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	401.0	491	491	491
Na	460	490	490	490
K	52	110	110	110
Ca	93	89	89	89
Mg	24	24	24	24
SiO_2	48.5	55	55	55
Cl	600	630	630	630
SO_4	47	260	260	260
PO_4	0.04	.04	.04	.04
TDS	1800	1900	1900	1900
SS	3.2			
S	2.38			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.20±0.06			
Rn (222)				
Th (230)	< 0.17			
Th (232)	< 0.17			
U (234)	≤0.06			
U (238)	≤0.06			
Pb (210)	< 1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.02			
As	0.02			
Ba	0.02			
B	1.1			
Cd	0.0003			
Cr	<0.003			
Cu	0.006			
Fe	0.019			
Cs	<0.07			
Pb	<0.015			
Li	0.81			
Mn	0.28			
Mo	<0.0			
Hg	0.001			
Ag	0.001			
Sr	0.75			
Se	0.32			
Rb	0.29			
Ni	0.037			
Sn	1.67			
Be	0.067			
Ti	0.026			
Tl	0.031			
V	0.139			
Sb	0.012			
Zn	0.014			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: INMEYER HOT SPRING
LOCATION - COUNTY: Elmore TOWNSHIP 5N RANGE 7E
SITE NO. 225, PRIORITY NO. 13

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.4	8.5	8.5	8.5
Cond. (µmhos/cm)		295	291	293
Temperature (°C)	75.2	76	76	76
Flow (l/min)		349	300	324.5
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	93.6	55	55	55
Na	65	67	67	67
K	1.5	1.8	1.8	1.8
Ca	1.9	1.1	1.1	1.1
Mg	0.29	.1	.1	.1
SiO_2	97.0	100	100	100
Cl	1.9 ppm	2.9	2.9	2.9
SO_4	23	31	31	31
PO_4	0.14	.03	.03	.03
TDS	270	267	267	267
SS	4.0 ppm			
S	0.92			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.18±0.05			
Rn (222) (in pCi/m³)				
Th (230)	< 0.19			
Th (232)	< 0.19			
U (234)	< 0.07			
U (238)	≤ 0.07			
Pb (210)	< 1.5			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	< 0.3			
As	< 0.05			
Ba	< 0.10			
B	< 0.05			
Cd	< 0.003			
Cr	< 0.03			
Cu	< 0.05			
Fe	0.049			
Cs	< 0.07			
Pb	< 0.03			
Li	0.09			
Mn	< 0.010			
Mo	< 0.10			
Hg	< 0.004			
Ag	< 0.05			
Sr	0.10			
Se	< 0.05			
Rb	< 0.07			
Ni	< 0.015			
Sn	< 1.0			
Be	< 0.015			
Ti	< 0.5			
Tl	< 0.04			
V	< 0.3			
Sb	< 0.01			
Zn	< 0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: ROYSTONE HOT SPRINGS
LOCATION - COUNTY Gem TOWNSHIP 7N RANGE 1E
SITE NO. 226 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.8	7.5	7.5	7.5
Cond. (μmhos/cm)		799	680	739.5
Temperature (°C)	60	74	55	65
Flow (l/min)		284	76	180
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	145.6	187	187	187
Na	165	160	160	160
K	7.0	7.7	7.7	7.7
Ca	8.8	8.7	8.7	8.7
Mg	0.44	.6	.6	.6
SiO_2	136	120	120	120
Cl	50.0	62	62	62
SO_4	240	110	110	110
PO_4	0.06	.04	.04	.04
TDS	685	577	577	577
SS	1.0			
S	0			
RADIOACTIVITY (in μCi/l)				
Ra (226)	< 0.06			
Rn (222)				
Th (230)	< 0.30			
Th (232)	< 0.30			
U (234)	< 0.10			
U (238)	< 0.10			
Pb (210)	< 1.5			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	< 0.3			
As	< 0.05			
Ba	< 0.10			
B	< 0.05			
Cd	< 0.003			
Cr	< 0.03			
Cu	< 0.05			
Fe	< 0.030			
Cs	< 0.07			
Pb	< 0.03			
Li	0.21			
Mn	< 0.010			
Mo	< 0.10			
Hg	< 0.004			
Ag	< 0.05			
Sr	0.20			
Se	< 0.05			
Ni	< 0.07			
Si	< 0.015			
[illegible]	< 1.0			
[illegible]	< 0.015			
[illegible]	< 0.5			
[illegible]	< 0.04			
[illegible]	< 0.3			
[illegible]	< 0.01			
Zn	0.026			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: BONNEVILLE HOT SPRINGS
LOCATION - COUNTY Boise TOWNSHIP 10N RANGE 10E
SITE NO. 228, PRIORITY NO. 10

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.3	8.1	8.1	8.1
Cond. (μmhos/cm)		377	350	363.5
Temperature (°C)	82	86	85	85.5
Flow (l/min)		1375	1325	1350
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	92.3	79	79	79
Na	85	67	67	67
K	2.4	2.9	2.9	2.9
Ca	2.8	2.2	2.2	2.2
Mg	0.19	.1	.1	.1
SiO_2	108	100	100	100
Cl	6.8	7.2	7.2	7.2
SO_4	36	52	52	52
PO_4	0.05	.03	.03	.03
TDS	300	306	306	306
SS	2.0			
S	1.80			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.36±0.11			
Rn (222)				
Th (230)	<0.12			
Th (232)	<0.12			
U (234)	0.23±0.10			
U (238)	0.23±0.10			
Pb (210)	<1.5			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.3			
As	<0.05			
Ba	<0.10			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	<0.05			
Fe	<0.030			
Cs	<0.07			
Pb	<0.03			
Li	0.11			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
Sr	0.18			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	<0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: WARDROP HOT SPRINGS
LOCATION - COUNTY Camas TOWNSHIP 1N RANGE 13E
SITE NO. 229, PRIORITY NO. 14

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.8	8.0	8.0	8.0
Cond. (μmhos/cm)		325	252	288.5
Temperature (°C)	48	66	66	66
Flow (l/min)		730	730	730
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	97.2	88	88	88
Na	55	54	54	54
K	0.65	3	3	3
Ca	1.6	1.4	1.4	1.4
Mg	0.19	-	-	-
SiO_2	76.0	73	73	73
Cl	3.8	5.1	5.1	5.1
SO_4	10	12	12	12
PO_4	0.07	.03	.03	.03
TDS	225	215	215	215
SS	0.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.11±0.03			
Rn (222)				
Th (230)	<0.33			
Th (232)	<0.33			
U (234)	0.10±0.06			
U (238)	0.12±0.07			
Pb (210)	<1.5			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.3			
As	<0.05			
Ba	<0.10			
B	<0.05			
Cd	<0.003			
Cr	<0.03			
Cu	<0.05			
Fe	<0.030			
Cs	<0.07			
Pb	<0.03			
Li	<0.07			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
Sr	0.75			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	<0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: IDAHO
SITE NAME: WHITE LICKS HOT SPRINGS
LOCATION - COUNTY: Adams TOWNSHIP 16N RANGE 2E
SITE NO. 230, PRIORITY NO. 17

	TRW DATA	HISTORICAL DATA (1) MAX	HISTORICAL DATA (1) MIN	HISTORICAL DATA (1) MEAN
PHYSICAL MEASUREMENTS:				
pH	7.5	7.6	7.6	7.6
Cond. (µmhos/cm)		2030	1575	1802.5
Temperature (°C)	65.5	68	--	66.5
Flow (l/min)		257	246	252
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A*			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)	110			
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	51.0	71	71	71
Na	390	420	420	420
K	16	17	17	17
Ca	40	39	39	39
Mg	.44	.3	.3	.3
SiO_2	120	110	110	110
Cl	185	150	150	150
SO_4	680	660	660	660
PO_4	0.055	.05	.05	.05
TDS	1400	1440	1440	1440
SS	15.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.39±0.12			
Rn (222)				
Th (230)	<0.09			
Th (232)	<0.09			
U (234)	<0.09			
U (238)	<0.09			
Pb (210)	<1.5			

	TRW DATA	HISTORICAL DATA (1) MAX	HISTORICAL DATA (1) MIN	HISTORICAL DATA (1) MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.3			
As	<0.05			
Ba	<0.10			
B	3.35			
Cd	<0.003			
Cr	<0.03			
Cu	<0.05			
Fe	0.035			
Cs	0.08			
Pb	0.048			
Li	0.26			
Mn	0.023			
Mo	<0.10			
Hg	<0.004			
Ag	<0.05			
Sr	1.1			
Se	<0.05			
Rb	0.09			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01			
Zn	<0.007			

*gas sample broken in transit

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: **MONTANA**
SITE NAME: **BOULDER HOT SPRINGS**
LOCATION: COUNTY **Jefferson** TOWNSHIP **5N** RANGE **4W**
SITE NO. **203**, PRIORITY NO. **4**

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.8	8.52	8.50	8.51
Cond. (µmhos/cm)		525	523	524
Temperature (°C)	71	76	62	69
Flow (l/min)				
GAS ANALYSIS:				
H_2S (ppm)	N/A	<0.5	<0.5	0.5
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 ($\mu g/m^3$)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	138.5			
Na	110	120	120	120
K	35	38	38	38
Ca	3.3	2.7	2.2	2.5
Mg	< 0.07	<0.1	<0.1	0.1
SiO_2	117	108	106	107
Cl	15	19	19	19
SO_4	71	74	74	74
PO_4	1.85			
TDS	435	508	507	508
SS	1.2			
S	0.68			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.20			
Rn (222)				
Th (230)	< 0.28			
Th (232)	< 0.28			
U (234)	<0.05			
U (238)	≤0.08			
Pb (210)	<1.9			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02	0.02	0.014	0.017
As	<0.01			
Ba	0.313			
B	0.4	0.56	0.54	0.55
Cd	0.003			
Cr	0.024			
Cu	0.005			
Fe	<0.005			
Cs	<0.07			
Pb	<0.015			
Li	0.25	0.20	0.22	0.23
Mn	0.004	<0.02	<0.02	<0.02
Mo	<0.02			
Hg	0.002			
Ag	0.001			
Sr	0.12			
Se	0.01			
Rb	0.08	0.06	0.06	0.06
Ni	0.202			
Sn	1.25			
Be	0.150			
Ti	<0.08			
Tl	<0.03			
V	0.22			
Sb	0.003			
Zn	0.002			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE MONTANA
SITE NAME GREGSON HOT SPRINGS (FAIRMONT)
LOCATION - COUNTY Silver Bow TOWNSHIP 3 N RANGE 10W
SITE NO 204, PRIORITY NO 3

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.7	8.41	8.41	8.41
Cond. (µmhos/cm)		761	761	761
Temperature (°C)	60	70	70	70
Flow (l/min)		1000	1000	1000
GAS ANALYSIS:				
H_2S (ppm)	N/A	1.6	1.6	1.6
CO (mg/m^3)				
CO_2 (%)		0.6	0.6	0.6
O_2 (%)				
NH_3 $(\mu g/m^3)$				
CH_4 (%)		0.6	0.6	0.6
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	84.0			
Na	155	165	165	165
K	4.0	3.9	3.9	3.9
Ca	4.3	3.9	3.9	3.9
Mg	0.1	<0.1	<0.1	<0.1
SiO_2	81.5	85	85	85
Cl	16	17	17	17
SO_4	67	180	180	180
PO_4	0.02			
TDS	550	640	640	640
F	2.4			
S	<0.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.66			
Rn (222)				
Th (230)	< 0.43			
Th (232)	<0.43			
U (234)	≤ 0.05			
U (238)	≤ 0.05			
Pb (210)	< 1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	1.07	0.016	0.016	0.016
As	0.01			
Ba	<0.02			
B	0.05	0.1	0.1	0.1
Cd	0.0003			
Cr	<0.003			
Cu	0.001			
Fe	0.01			
Cs	0.08			
Pb	<0.015			
Li	0.68	0.64	0.64	0.64
Mn	0.008	< 0.2	< 0.2	< 0.2
Mo	<0.02			
Hg	0.006			
Ag	0.002			
Ni	<0.001			
Se	0.01			
Rb	0.08	0.04	0.04	0.04
Sr	0.162			
Sn	0.07			
Br	0.072			
Ti	0.045			
Tl	0.063			
V	<0.05			
W	0.021			
Zn	0.005			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE MONTANA
SITE NAME BARKEL'S SILVER STAR HOT SPRING
LOCATION - COUNTY Madison TOWNSHIP 2 S RANGE 6W
SITE NO. 206, PRIORITY NO. 5

	TRW DATA	HISTORICAL DATA (1) MAX	HISTORICAL DATA (1) MIN	HISTORICAL DATA (1) MEAN
PHYSICAL MEASUREMENTS:				
pH	8.1	8.17	8.17	8.17
Cond. (µmhos/cm)		808	808	808
Temperature (°C)	65.5	71.5	71.5	71.5
Flow (l/min)		150	150	150
GAS ANALYSIS:				
H_2S (ppm)	N/A	1.0	1.0	1.0
CO (mg/m^3)				
CO_2 (%)		1.2	1.2	1.2
O_2 (%)				
NH_3 ($\mu g/m^3$)				
CH_4 (%)		<66	<66	<66
CHEMICAL ANALYSIS MAJOR CONSTITUENTS (in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	77.2			
Na	155	170	170	170
K	6.7	6.4	6.4	6.4
Ca	9.7	9.3	9.3	9.3
Mg	0.33	0.3	0.3	0.3
HCO_3	106	110	110	110
Cl	32	31	31	31
SO_4	58	190	190	190
PO_4	0.01			
TDS	585	696	696	696
SS	5.6			
F	0.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.05±0.26			
Rn (222)				
Th (230)	< 0.51			
Th (232)	< 0.51			
U (234)	< 0.12			
U (238)	< 0.12			
Pb (210)	< 1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1) MAX	HISTORICAL DATA (1) MIN	HISTORICAL DATA (1) MEAN
Al	<0.07	0.007	0.007	0.007
As	0.01			
Be	<0.02			
B	< 0.05	0.25	0.25	0.25
Cd	0.0003			
Cr	<0.003			
Cu	0.006			
Fe	< 0.005			
Cs	<0.07			
Pb	<0.015			
Li	0.33	0.34	0.34	0.34
Mn	0.093	0.02	0.2	0.02
Mo	<0.02			
Hg	0.005			
Ag	0.002			
[illegible]	0.29			
Se	<0.03			
Rb	0.08	0.05	0.05	0.05
Si	0.154			
Sn	<0.07			
Ba	0.038			
Ti	0.045			
[illegible]	<0.03			
[illegible]	<0.05			
Sb	0.010			
Zn	0.020			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: MONTANA
SITE NAME: NORRIS HOT SPRINGS (BEARTRAP)
LOCATION - COUNTY: Madison TOWNSHIP: 3 S RANGE: 1w
SITE NO. 207, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.0	7.58	7.58	7.58
Cond. (µmhos/cm)	1070	903	903	903
Temperature (°C)	49	52.5	52.5	52.5
Flow (l/min)		400	400	400
GAS ANALYSIS:				
H_2S (ppm)	N/A	<1	<1	<1
CO (mg/m³)				
CO_2 (%)		2.8	2.8	2.8
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (ppm)		0.2	0.2	0.2
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l):				
Alkalinity (mg/l as $CaCO_3$)	157.0			
Na	190	180	180	180
K	8.1	10	10	10
Ca	18	17	17	17
Mg	3.0	3.2	3.2	3.2
SiO_2	99	88	88	80
Cl	30	23	23	23
SO_4	97	130	130	130
PO_4	0.04			
TDS	695	839	839	839
F	1.2			
S	0.51			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.95±0.28			
Rn (222)				
Th (230)	<0.36			
Th (232)	<0.36			
U (234)	≤0.19			
U (238)	≤0.06			
Pb (210)	2.6±1.4			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02	<0.001	<0.001	<0.001
As	0.005			
Ba	<0.02			
B	<0.05	0.1	0.1	0.1
Cd	0.003			
Cr	<0.003			
Cu	0.001			
Fe	0.038			
Cs	<0.07			
Pb	<0.015			
Li	0.09	0.09	0.09	0.09
Mn	0.083			
Mo	<0.02			
Hg	0.005			
Ag	0.001			
Sr	0.18			
Se	0.02			
Rb	0.11	0.08	0.08	0.08
Ni	0.064			
Sb	<0.07			
Br	0.44			
Ti	<0.08			
Tl	<0.03			
V	0.102			
Sn	0.014			
Zn	0.004			

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BOTTOM OF IMAGE AREA OUTSIDE DIMENSION FOR TABLES AND ILLUSTRATIONS

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: MONTANA
SITE NAME: JARDINE HOT SPRINGS (BIG HOLE/JACKSON)
LOCATION - COUNTY Beaverhead TOWNSHIP 5 S RANGE 15W
SITE NO. 208, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.1	6.77	6.77	6.77
Cond. (µmhos/cm)	1045	972	972	972
Temperature (°C)	57	58	58	58
Flow (l/min)		1000	1000	1000
GAS ANALYSIS:				
H_2S (µg/m^3)	451	0.6*	0.6*	0.6*
CO (mg/m^3)	<100			
CO_2 (%)	6.4	16	16	16
O_2 (%)	10.7			
NH_3 (µg/m^3)	<1			
CH_4 (mg/m^3)	<100	<0.1**	<0.1**	<0.1**
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	252.7			
Na	220	240	240	240
K	12	10	10	10
Ca	11	10	10	10
Mg	3.3	3.7	3.7	3.7
HCO_3	39.5	52	52	52
Cl	<0.1	7.7	7.7	7.7
SO_4	37	45	45	45
PO_4	0.1			
TDS	680	986	986	986
SiO_2	2.4			
F	0.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	2.8±0.8			
Rn (222)	2.16x10^4			
Th (230)	<0.35			
Th (232)	<0.35			
U (234)	≤0.05			
U (238)	≤0.05			
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	2.86	<0.001	<0.001	<0.001
As	0.03			
Ba	0.139			
B	0.6	0.83	0.83	0.83
Cd	0.0004			
Cr	0.029			
Cu	0.002			
Fe	<0.005			
Cs	<0.07			
Pb	<0.015			
Li	0.31	0.32	0.32	0.32
Mn	0.20	0.04	0.04	0.04
Mo	<0.02			
Hg	0.006			
Ag	0.0002			
Sr	1.75			
Se	0.02			
Rb	<0.07	0.03	0.03	0.03
Ni	0.040			
Sn	<0.07			
Be	0.044			
[illegible]	0.045			
Ti	0.031			
V	<0.05			
[illegible]	0.014			
Zn	0.009			

*ppm
**%

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: MONTANA
SITE NAME: THEXTON HOT SPRINGS
LOCATION - COUNTY ______ TOWNSHIP 2 N RANGE 31W
SITE NO. 250 , PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (0) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.6			
Cond. (μmhos/cm)				
Temperature (°C)	78			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	153.6			
Na	315			
K	15			
Ca	6.0			
Mg	0.37			
SiO_2	126			
Cl	140			
SO_4	75			
PO_4	0.01			
TDS	1050			
SS	3.6			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.90±0.27			
Rn (222)				
Th (230)	<0.34			
Th (232)	<0.34			
U (234)	<0.17			
U (238)	<0.17			
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (0) MAX	MIN	MEAN
Al	<0.04			
As	0.01			
Ba	<0.02			
B	0.4			
Cd	0.0003			
Cr	<0.003			
Cu	0.002			
Fe	0.008			
Cs	<0.07			
Pb	<0.015			
Li	0.24			
Mn	0.056			
Mo	<0.02			
Hg	0.008			
Ag	0.002			
Sr	0.04			
Se	0.01			
Rb	0.15			
Ni	0.071			
Sn	1.21			
Br	0.080			
Ti	0.054			
Tl	<0.03			
V	0.067			
W	0.003			
Zn	0.005			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME WALLEY'S (GENOA) HOT SPRINGS
LOCATION - COUNTY Douglas TOWNSHIP 13 N RANGE 19E
SITE NO. 71 , PRIORITY NO. 25

	THW DATA	HISTORICAL DATA (8)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.2	9.4	8.77	8.98
Cond. (μmhos/cm)		761	644	715
Temperature (°C)	58	61	61	61
Flow (l/min)		2271	75	1173
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)		[illegible]	[illegible]	[illegible]
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	63.1			
Na	130	150	118	137
K	2.8	3.6	2.2	2.9
Ca	9.3	**110**	**9.6**	**23.4**
Mg	0.11	1.1	.01	.43
SiO_2	61.0	61.0	49.0	56.2
Cl	38.0	50	38	44.6
SO_4	**90**	235	94	189.3
PO_4	0.087	<0.1	0.04	0.07
TDS	610	544	437	490.4
SS	5.0			
S	0.102			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**< 0.07**	.52	.32	.42
Rn (222)		625	537	580
Th (230)	**< 0.25**	<.029	<.029	<.029
Th (232)	**< 0.25**	<.022	<.022	<.022
U (234)	**≤ 0.05**	.046	.012	.029
U (238)	**≤ 0.05**	<.0062	<.0062	<.0062
Pb (210)	**< 1.9**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (8)		
		MAX	MIN	MEAN
Al	1.0	.032	.032	.032
As	<0.05	.001	.001	.001
Ba	0.75	<.04	<.04	<.04
B	1.0	5.3	.83	3.7
Cd	<0.003	<.005	<.005	<.005
Cr	<0.03	.02	.02	.02
Cu	0.28	<.02	<.01	<.015
Fe	0.031	.06	.01	.04
Cs	<0.07			
Pb	0.11	.02	.02	.02
Li	0.16	.2	.19	.195
Mn	<0.010	<.02	<.01	<.015
Mo	<0.10			
Hg	<0.004	<.0005	<.0005	<.0005
Au	<0.060	.02	.0001	.0101
Sr	<0.10	.3	.064	.182
Se	<0.06	<.001	<.001	<.001
Rb	<0.07	.041	.03	.035
Ni	<0.015	.02	.02	.02
Sn	<1.0	<.05	<.05	<.05
Ag	<0.015	<.005	<.005	<.005
Ti	<0.5			
Tl	<0.04			
I	<0.3			
V	<0.01	.041	.041	.041
Zn	0.013			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE NEVADA
SITE NAME HOT HOLE ELKO (ELKO HOT SPRINGS)
LOCATION - COUNTY Elko TOWNSHIP 34 N RANGE 56E
SITE NO. 72, PRIORITY NO. 23

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS				
pH	7.5	7.2	7.2	7.2
Cond. (μmhos/cm)	-	908	908	908
Temperature (°C)	52	58	56	57
Flow (l/min)				
GAS ANALYSIS				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)		324.3	324.3	324.3
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	398.4	488	488	488
Na	110	120	120	120
K	38	39	39	39
Ca	64	60	60	60
Mg	16	**15.5**	**15.5**	**15.5**
SiO_2	134	65	65	65
Cl	18.5	16	16	16
SO_4	**53**	72	72	72
PO_4	0.0375	.06	.06	.06
TDS	610			
SS	0.1			
S	1.02			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**4.5±1.4**	6.16	5.44	5.8
Rn (222)		214	146	180
Th (230)	**< 0.34**	1.99	1.31	1.65
Th (232)	**< 0.34**	<.1	<.1	<.1
U (234)	**≤ 0.17**	<.1	<.1	<.1
U (238)	**< 0.09**	<.1	<.1	<.1
Pb (210)	**< 1.9**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	3.4	.002	.002	.002
As	< 0.025			
Ba	0.70			
B	1.55	.7	.7	.7
Cd	< 0.003			
Cr	0.03			
Cu	0.23	.04	.04	.04
Fe	< 0.030	<.02	<.02	<.02
Cs	0.06			
Pb	0.065			
Li	0.33	.33	.33	.33
Mn	< 0.010	.02	.02	.02
Mo	< 0.10			
Hg	< 0.010			
Ag	0.20	.0001	.0001	.0001
Sr	1.8	3.4	3.4	3.4
Se	< 0.20			
Rb	0.11	.1	.1	.1
Ni	0.024			
Sn	< 1.0			
Be	0.015			
Ti	< 0.5			
Tl	< 0.04			
V	< 0.3			
Sb	< 0.060			
Zn	0.022			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: HOT SULFUR SPRINGS
LOCATION - COUNTY Elko TOWNSHIP 38 N RANGE 62E
SITE NO. 73 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	7.3	7.0	7.2
Cond. (μmhos/cm)		1700	753	1257
Temperature (°C)	49	90	90	90
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	962.3	1180	345	763
Na	310	390	160	275
K	33	41	16	**28.5**
Ca	86	49	12	30.5
Mg	33	13	.3	6.7
SiO_2	135	165	84	124.5
Cl	61.0	40	22	31
SO_4	**19**			
PO_4	0.077	61	16	**39.5**
TDS	1280			
SS	11.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**19±6**	14.55	**13.45**	14
Rn (222)				
Th (230)	**<0.18**	.0188	0	.0094
Th (232)	**<0.18**	.0188	0	.0094
U (234)	**0.21±0.10**	.105	.051	.078
U (238)	**0.13±0.08**	.087	.039	.063
Pb (210)	**<1.9**			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	2.9			
As	<0.025			
Be	0.50			
B	<0.10	1.2	.77	.99
Cd	<0.003			
Cr	<0.03			
Cu	0.26			
Fe	0.071			
Cs	0.08			
Pb	0.066			
Li	0.03	.8	.7	.75
Mn	0.010			
Mo	0.010			
Hg	<0.010			
Ag	<0.060			
Sr	1.6			
Se	<0.020			
Rb	0.31			
Ni	0.018			
Sn	<1.0			
Ge	0.015			
Ti	<0.5			
Tl	0.04			
V	<0.3			
Sb	<0.080			
Zn	<0.028			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: BEOWAWE-MAGNA
LOCATION - COUNTY Eureka TOWNSHIP 31 N RANGE 48E
SITE NO. 75 , PRIORITY NO. 10

	TRW DATA	HISTORICAL DATA (24)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.8	9.9	8.7	9.45
Cond. (µmhos/cm)		1490	590	947
Temperature (°C)	92	100	25	78
Flow (l/min)		473	96.4	285.7
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)		5640	846	1612
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	369.8	586	105	290
Na	250	280	151	230
K	26	40	6	24.5
Ca	1.0	32	.1	6.2
Mg	4.4	8	0	.62
SiO_2	375	534	234	387
Cl	62.0	70	9	50.5
SO_4	63	210	53	98.6
PO_4	0.1375	.5	.02	.16
TDS	1095	1620	855	1097
SS	3.0	10.1	2.8	6.5
S	0			
RADIOACTIVITY (in µCi/l)				
Ra (226)	0.13±0.04	.16	.05	.11
Rn (222)		170	55	112.5
Th (230)	<0.28	12.05	.81	6.43
Th (232)	<0.28	21.46	<.24	10.85
U (234)	≤0.05	188.38	<.1	94.24
U (238)	≤0.05	148.2	<.1	74.15
Pb (210)	≤1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (24)		
		MAX	MIN	MEAN
Al	5.9	.66	0	.17
As	<0.025	.05	0	.02
Ba	0.26	.19	.005	.063
B	1.6	7	.9	2.65
Cd	<0.003	.01	.0001	.003
Cr	0.03	<.04	.004	.017
Cu	0.50	<.1	.0003	.041
Fe	<0.030	.670	0	.102
Cs	0.20	.22	.115	.176
Pb	0.072	.08	<.02	.04
Li	1.4	3.2	1.3	1.96
Mn	0.010	.115	0	.033
Mo	<0.10	.019	.003	.011
Hg	<0.010	.07	.0004	.005
Ag	<0.060	<.02	<.02	<.02
Sr	0.33	.21	0	.067
Se	<0.20	<1.0	.005	.337
Rb	0.34	.44	.145	.277
Ni	0.018	.05	.0001	.02
Sn	<1.0	.05	.05	.05
Be	0.015	<.005	<.005	<.005
Ti	<0.5	<.1	<.1	<.1
Tl	<0.04			
U	<0.3	<.1	<.1	<.1
V	<0.080	<.1	.005	.032
Zn	0.053	2.32	0.001	0.583

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: GOLCONDA HOT SPRINGS
LOCATION - COUNTY Humbolt TOWNSHIP 36 N RANGE 40E
SITE NO. 77, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.8	6.9	6.5	6.7
Cond. (µmhos/cm)		810	810	810
Temperature (°C)	68	75	74	74.5
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	201			
CO (mg/m³)	<116			
CO_2 (%)	37.6	38	38	38
O_2 (%)	5.6			
NH_3 (µg/m³)	663	211.5	211.5	211.5
CH_4 (mg/m³)	2619	663	663	663
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	354.8			
Na	130	130	130	130
K	20	22	22	22
Ca	34	33	33	33
Mg	6.6	6.3	6.3	6.3
SiO_2	145	66	66	66
Cl	20.5	16	16	16
SO_4	46	56	56	56
PO_4	0.25	.04	.04	.04
TDS	560			
SS	66.0			
S	0.68			
RADIOACTIVITY (in pCi/l)				
Ra (226)	8.4±2.5	56.1	55.9	57
Rn (222)		521	399	460
Th (230)	<0.40	13.47	10.61	12.04
Th (232)	<0.40	22.66	19.76	21.21
U (234)	≤ 0.13	183.46	179.66	181.56
U (238)	≤ 0.08	170.75	167.09	168.92
Pb (210)	≤ 1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	0.50	.002	.002	.002
As	<0.025	.02	.02	.02
Ba	0.31			
B	1.45	1.1	1.1	1.1
Cd	<0.003			
Cr	<0.03			
Cu	0.16	.05	.05	.05
Fe	<0.030	.22	.22	.22
Cs	0.10			
Pb	<0.03			
Li	0.39	.36	.36	.36
Mn	<0.010	1	1	1
Mo	<0.10			
Hg	<0.010	.0001	.0001	.0001
Ni	<0.060			
Sr	0.45	.71	.71	.71
Se	<0.20			
Rb	0.14	.09	.09	.09
Sb	<0.015			
Sn	<0.025			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
W	<0.060			
Zn	0.016			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: WABUSKA
LOCATION - COUNTY Lyon TOWNSHIP 15 N RANGE 25E
SITE NO. 78 , PRIORITY NO. 16

	TRW DATA	HISTORICAL DATA (14)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.9	8.76	7.9	8.38
Cond. (µmhos/cm)		1656	560	1306
Temperature (°C)	93.3	105.6	20.9	77.6
Flow (l/min)		1514	56.8	678
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2				
O_2				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	60	195	38.0	96.7
Na	290	340	276	301
K	12	34	12	16.6
Ca	38	340	46	54.4
Mg	0.17	75	0	6.9
SiO_2	155	115	53	93
Cl	49.0	54	24	44
SO_4	720	760	80	563
PO_4	0.10	.2	.2	.2
TDS	1225	1279	1050	1180
SS	12.0	.5	.5	.5
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.09	.57	.37	.47
Rn (222)				
Th (230)	<0.20	<.0017	<.0017	<.0017
Th (232)	<0.20	0.023	0.023	0.023
U (234)	<0.06	.040	.006	.023
U (238)	<0.06	.051	.013	.032
Pb (210)	<1.9	.027	.001	.014

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (14)		
		MAX	MIN	MEAN
Al	<0.3	.017	.017	.017
As	<0.05	.05	.0011	.04
Ba	0.19	.14	.05	.38
B	2.6	10	.96	2.5
Cd	0.004	<.01	.0001	.0037
Cr	0.04	<.02	.004	.009
Cu	0.11	.06	.0001	.0186
Fe	0.033	.41	.004	.06
Co	<0.07			
Pb	0.069	.07	.0003	.0238
Li	0.20	.302	.25	.288
Mn	0.014	.044	.006	.019
Mo	<0.10			
Hg	<0.004	<.0005	.00002	.0002
Ag	<0.060	<.02	.015	.016
Ni	0.15	.25	.25	.25
Se	<0.05	.006	<.001	.004
Rb	0.12	.152	.09	.121
Sr	0.044	.08	.0005	.0276
Sn	<1.0	.05	.05	.05
Be	<0.015	.007	.007	.007
Ti	<0.5			
Tl	0.040			
V	<0.3			
Sb	<0.01	<.1	.1	.1
Zn	0.031			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: LEACH HOT SPRINGS
LOCATION - COUNTY Pershing TOWNSHIP 32 N RANGE 38E
SITE NO. 79 , PRIORITY NO. 19

	TRW DATA	HISTORICAL DATA (6)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.0	8.0	7.4	7.7
Cond. (umhos/cm)		811	811	811
Temperature (°C)	74	96	75	88.5
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)		282	282	282
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	306.2			
Na	170	164	80	129.4
K	11	13	4	8.2
Ca	9.8	10	7	8.2
Mg	1.1	.5	.5	.5
SiO_2	135	183	89	126.5
Cl	27.0	29	12	21.6
SO_4	35	53	53	53
PO_4	0.212	.07	.07	.07
TDS	600			
SS	25.0			
S	1.29			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.16±0.05	.47	.19	.33
Rn (222)		58	24	41
Th (230)	<0.33	131	.63	.97
Th (232)	<0.33	1.03	.43	.73
U (234)	<0.11	<.1	<.1	<.1
U (238)	<0.06	<.1	<.1	<.1
Pb (210)	2.7±1.4			

	THW DATA	HISTORICAL DATA (6)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	2.8	.009	.009	.009
As	<0.05	.012	.003	.007
Ba	<0.10	.19	.13	.17
B	1.25	1.2	1.2	1.2
Cd	<0.003			
Cr	<0.03			
Cu	0.14	.01	.01	.01
Fe	<0.030	.95	<.02	.225
Cs	0.15	.115	.065	.098
Pb	<0.03			
Li	0.87	1.7	1.7	1.7
Mn	0.053	.06	.012	.040
Mo	<0.10	.013	.001	.007
Hg	<0.004	.0006	.0006	.0006
Ag	<0.050			
Sr	1.1	.29	.29	.29
Se	<0.05			
Rb	0.17	.12	.04	.097
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.3			
Sb	<0.01	.18	.009	.085
Zn	0.020			

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TABLE 6 (continued)

SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: GREAT BOILING (GERLACH/MUD) HOT SPRINGS
LOCATION - COUNTY Washoe TOWNSHIP 32 N RANGE 23E
SITE NO. 83 , PRIORITY NO. 20

	TRW DATA	HISTORICAL DATA (7)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.4	8.08	7.13	7.56
Cond. (umhos/cm)		7830	4135	6645
Temperature (°C)		86.1	19.4	56.1
Flow (l/min)		757	189.3	473.1
GAS ANALYSIS:				
H_2S (μg/m^3)	150			
CO (mg/m^3)	<116			
CO_2 (%)	6.1			
O_2 (%)	14			
NH_3 (μg/m^3)	2	564	564	564
CH_4 (mg/m^3)	23868			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	82.62			
Na	1280	1548	1400	1475
K	121.5	130	112	1215
Ca	67	102	66	78.4
Mg	1.4	26	.98	8.25
SiO_2	275	199	135	167
Cl	1790	2238	2016	2139
SO_4	340	400	353	380
PO_4	0.0375	.2	.1	.15
TDS	4410	4596	4486	4541
SS	6.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	2.0±0.6	2.32	1.88	2.1
Rn (222)	48.3*			
Th (230)	<0.36	<.37	<.37	<.37
Th (232)	<0.36	<.1	<.1	<.1
U (234)	≤0.14	<.1	<.1	<.1
U (238)	≤0.14	<.1	<.1	<.1
Pb (210)	<1.9			

* pCi/m^3

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (7)		
		MAX	MIN	MEAN
Al	0.4	.011	.011	.011
As	0.16	.05	.0033	.027
Ba	0.23	<.04	<.04	<.04
B	7.65	9.9	9.9	9.9
Cd	<0.003	.01	.01	.01
Cr	<0.03	<.02	<.02	<.02
Cu	0.14	.08	<.01	.035
Fe	<0.030	.09	.02	.055
Cs	0.28			
Pb	0.077	.08	.08	.08
Li	1.64	3.52	1.6	2.56
Mn	0.022	.03	.018	.024
Mo	<0.10			
Hg	<0.004	.0007	<.0001	.0004
Ag	<0.060	<.02	<.02	<.02
Sr	2.1	2.6	.408	1.5
Se	<0.05	<.001	<.001	<.001
Rb	1.04	1.73	.94	1.33
Ni	<0.015	.05	.05	.05
Sn	<1.0	<.05	<.05	<.05
Be	<0.015	<.005	<.005	<.005
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.010	.03	.03	.03

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: LAWTON HOT SPRINGS (RIVER INN)
LOCATION - COUNTY Washoe TOWNSHIP 19N RANGE 18E
SITE NO. 84 , PRIORITY NO. 11

	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.2	9.13	9.13	9.13
Cond. (μmhos/cm)				
Temperature (°C)	44	47.8	47.8	47.8
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	75.3			
Na	110			
K	1.4			
Ca	6.8			
Mg	0.11			
SiO_2	430			
Cl	620			
SO_4	63			
PO_4	0.12			
TDS	4905			
SS	2.0			
S	0.034			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.09±0.03	.143	.047	.095
Rn (222)		501	419	460
Th (230)	<0.41	.117	.006	.061
Th (232)	<0.41	.064	.004	.034
U (234)	<0.07	<1.1	<1.1	<1.1
U (238)	<0.07	<.88	<.88	<.88
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
Al	<0.3			
As	0.12			
Ba	0.83			
B	1.6			
Cd	<0.002			
Cr	<0.030			
Cu	0.17			
Fe	<0.030			
Cs	<0.07			
Pb	0.13			
Li	0.15			
Mn	<0.015			
Mo	<0.10			
Hg	<0.004			
Ag	<0.080			
Sr	0.16			
Se	<0.05			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
W	<0.010			
Zn	0.013			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: STEAMBOAT
LOCATION - COUNTY Washoe TOWNSHIP 18N RANGE 20E
SITE NO. 88 PRIORITY NO. 12

	THW DATA	HISTORICAL DATA (16)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS				
pH	7.3	9.6	7.1	7.9
Cond. [illegible]		3240	3210	3261
Temperature [illegible]	91.0	104	57.2	90.[illegible]
Flow [illegible]				
GAS ANALYSIS				
H_2S [illegible]	4011	2.4**	2.4**	2.2**
[illegible]	*	93	93	93
CO_2 [illegible]	*			
N_2 [illegible]	*			
NH_3 [illegible]	*	1**	1**	1**
CH_4 [illegible]	*	1***	1***	1***
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	243.0	373	51.2	207
Na	620	707	9.5	588
K	54	101	4.6	61.0
Ca	6.5	30.0	0.0	11.6
Mg	0.17	9.0	0.0	2.4
[illegible]	370	332	14	227
Cl	900	1050	0.5	707
SO_4	63	199	3.0	115
PO_4	0.12	2.7	0.32	1.51
TDS	2845	2844	1980	2358
[illegible]	9.0	1.5	1.5	1.5
[illegible]	0.0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.76±0.23**	0.4	[illegible]	0.35
Rn (222) (in pCi/m³)		66	66	66
Th (230)	**<0.34**	0.065	0.065	0.065
Th (232)	**<0.49**	<0.1	<0.1	<0.1
U (234)	**±0.13**	0.029	0.029	0.029
U (238)	**±0.16**	0.021	0.021	0.021
Pb (210)	**<1.9**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (16)		
		MAX	MIN	MEAN
Al	0.1	1.0	0.009	0.30
As	0.050	3.3	0.34	1.66
Ba	0.045	1.04	0.04	0.04
B	27.0	[illegible]	47.[illegible]	[illegible]
Cd	0.004	0.0002	0.000[illegible]	[illegible]
Cr	[illegible]	0.01	[illegible]	[illegible]
Cu	0.076	0.01	0.0002	0.0061
Fe	0.062	0.76	[illegible]	[illegible]
[illegible]	1.9[illegible]			
[illegible]	0.13	0.0004	0.0004	0.0004
[illegible]	7.60	[illegible]	[illegible]	6.64
Mn	0.027	[illegible]	[illegible]	[illegible]
Mo	[illegible]			
Hg	<0.004	<0.01	0.00002	0.004
Ag	0.060			
[illegible]	0.12	1.4	1.3	1.3
[illegible]	0.050	0.0032	0.0032	0.0032
Rb	5.0	0.7	0.7	0.7
[illegible]	0.015	0.0005	0.0005	0.0005
[illegible]	1.0	0.05	0.05	0.05
[illegible]	0.015			
[illegible]	0.60			
[illegible]	0.040			
V	0.30			
[illegible]	0.25			
Zn	0.019	0.003	0.003	0.003

* Sample bottle broke
** ppm
*** % by volume

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: MONTE NEVA (GOODRICH/MELVIN) HOT SPRINGS
LOCATION - COUNTY White Pine TOWNSHIP 13 S RANGE 63E
SITE NO. 90 , PRIORITY NO. 16

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.0	6.35	6.35	6.35
Cond. (μmhos/cm)		522	522	522
Temperature (°C)	91	79	76.9	78.4
Flow (l/min)		2366	2366	2366
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)		26	26	26
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)		661	661	661
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	243.0			
Na	20	16	16	16
K	5.0	5.6	5.6	5.6
Ca	76	76	63	68.1
Mg	22	22	21	21.3
SiO_2	134	67	52	57.7
Cl	4.4	10	5	7.2
SO_4	14	34	25	28.3
PO_4	0.212			
TDS	504	361	349	350
SS	2.2			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	12±4	141.8	138.2	140
Rn (222)				
Th (230)	<0.33	<.0077	<.0077	<.0077
Th (232)	<0.33	<.0063	<.0063	<.0063
U (234)	0.22±0.12	.032	.004	.018
U (238)	≤0.14	<.0089	<.0089	<.0089
Pb (210)	2.6±1.4			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
Al	0.7			
As	0.025			
Ba	0.82			
B	<0.05	.04	.04	.04
Cd	<0.003			
Cr	<0.030			
Cu	0.71	.01	.01	.01
Fe	<0.030	.19	.02	.105
Cs	0.07			
Pb	<0.042			
Li	0.98	.07	.07	.07
Mn	<0.010	<.02	<.02	<.02
Mo	<0.10			
Hg	<0.010	<.0001	<.0001	<.0001
Ag	<0.060			
Sr	0.55			
Se	<0.20			
Rb	0.08	.03	.03	.03
Ni	0.03			
Sn	<1.0			
Be	0.015			
Ti	<0.5			
Tl	<0.040			
V	0.30			
Sb	<0.080			
Zn	0.031			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: FLY RANCH (WARD'S HOT SPRINGS)
LOCATION - COUNTY: Washoe, TOWNSHIP 34 N, RANGE 23E
SITE NO. 174, PRIORITY NO. 13

	TRW DATA	HISTORICAL DATA (7)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.1	9.0	7.2	7.4
Cond. (μmhos/cm)		1840	420	727
Temperature (°C)	97	25	21	23
Flow (l/min)		11.4	[illegible]	9.6
GAS ANALYSIS:				
H_2S (μg/m³)	5.9			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	214.8			
Na	320	386	35	177
K	13	19	8.9	12.8
Ca	18	72	16	43.9
Mg	4.0	21	3	12.8
SiO_2	84.5	113	69	85.4
Cl	275	250	38	115
SO_4	48	390	42	126.9
PO_4	0.0375			
TDS	1115	1170	339	644
SS	21			
[illegible]	6.07			
RADIOACTIVITY (in pCi/l)				
Ra (226)	2.9±0.9			
Rn (222)				
Th (230)	<0.35			
Th (232)	<0.49			
U (234)	1.9±0.8			
U (238)	<0.49			
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (7)		
		MAX	MIN	MEAN
Al	<0.3			
As	<0.05			
Ba	0.17			
B	[illegible]	[illegible]	[illegible]	[illegible]
Cd	<[illegible]			
Cr	<0.030			
Cu	0.19			
Fe	[illegible]	[illegible]	.02	.02
[illegible]	0.15			
[illegible]	<0.12			
[illegible]	0.44			
[illegible]	<[illegible]			
[illegible]	<0.10			
[illegible]	<0.004			
[illegible]	<[illegible]			
[illegible]	0.83			
[illegible]	<0.050			
[illegible]	0.12			
[illegible]	<0.015			
[illegible]	<1.0			
[illegible]	<0.015			
[illegible]	<0.5			
[illegible]	<0.040			
[illegible]	<0.30			
[illegible]	<0.010			
Zn	0.006			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: BALTAZOR HOT SPRINGS
LOCATION - COUNTY: HUMBOLDT TOWNSHIP 46 RANGE 28E
SITE NO. 186, PRIORITY NO. 14

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.6	8.0	8.0	8.0
Cond. (µmhos/cm)		947	947	947
Temperature (°C)	87.7	80	80	80
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	150			
*CO (mg/m³)				
*CO_2 (%)				
*O_2 (%)				
NH_3 (µg/m³)	324			
*CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1336			
Na	185	180	180	180
K	7.3	8.7	8.7	8.7
Ca	10	8.4	8.4	8.4
Mg	0.094	<.1	<.1	<.1
SiO_2	149	160	160	160
Cl	51	48	48	48
SO_4	51			
PO_4	0.12	.07	.07	.07
TDS	715			
SS	3.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.08			
Rn (222)	*			
Th (230)	<0.36			
Th (232)	≤0.36			
U (234)	±0.62			
U (238)	≤0.36			
Pb (210)	<1.9			

* Gas bottle broke when van was in an accident

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	0.60			
As	<0.05	.07	.07	.07
Ba	<0.10			
B	1.8	2.9	2.4	2.6
Cd	<0.003			
Cr	<0.03			
Cu	0.11	<.01	<.01	<.01
Fe	0.16	<.02	<.02	<.02
Cs	<0.07			
Pb	<0.03			
Li	0.21			
Mn	0.014	<.02	[illegible]	<.01
Mo	<0.10			
Hg	<0.004			
Ag	<0.050			
Ni	0.28			
Se	<0.050			
Rb	0.08	.08	.08	.08
Sr	<0.015			
Sn	<1.0			
Sb	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.30			
W	0.015			
Zn	0.018			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: BALTAZOR HOT SPRINGS (WELL)
LOCATION - COUNTY Humbolt TOWNSHIP 46 RANGE 28E
SITE NO. 186 , PRIORITY NO. 14

	TRW DATA	HISTORICAL DATA (O)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.4			
Cond. (umhos/cm)				
Temperature (°C)	92			
Flow (l/min)				
GAS ANALYSIS:				
H_2S ($\mu g/m^3$)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 ($\mu g/m^3$)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	133.6			
Na	180			
K	8.0			
Ca	9.6			
Mg	0.22			
SiO_2	154			
Cl	49.0			
SO_4	48			
PO_4	0.225			
TDS	970			
SS	7.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.08±0.02			
Rn (222)				
Th (230)	<0.38			
Th (232)	<0.38			
U (234)	1.0+0.6			
U (238)	≤ 0.38			
Pb (210)	<1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (O)		
		MAX	MIN	MEAN
Al	<0.30			
As	0.05			
Ba	<0.10			
B	2.05			
Cd	<0.003			
Cr	<0.03			
Cu	0.16			
Fe	0.17			
Cs	<0.07			
Pb	<0.03			
Li	0.22			
Mn	0.014			
Mo	<0.10			
Hg	<0.004			
Ag	<0.060			
Sr	0.18			
Se	<0.05			
Rb	0.08			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.30			
Sb	0.028			
Zn	0.015			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: KYLE HOT SPRINGS
LOCATION - COUNTY: Pershing TOWNSHIP 29 N RANGE 36E
SITE NO. 210 , PRIORITY NO. 17

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.4	6.5	6.5	6.5
Cond. (μmhos/cm)		3220	3220	3220
Temperature (°C)	65	77	59	68
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	852			
CO (mg/m³)				
CO_2 (%)		93	93	93
O_2 (%)				
NH_3 (μg/m³)	57	564	564	564
CH_4 (mg/m³)		663	663	663
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	932.5			
Na	590	540	535	537.5
K	58	80	77	78.5
Ca	94	95	87	91
Mg	32	25.5	25.5	25.5
SiO_2	167.0	155	150	152.5
Cl	850	770	730	750
SO_4	62	51	51	51
PO_4	0.12	.02	.02	.02
TDS	2350			
SS	1395			
S	5.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	11±3			
Rn (222)	*			
Th (230)	< 0.21			
Th (232)	< 0.21			
U (234)	0.11±0.07			
U (238)	0.12±00.7			
Pb (210)				

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	12.0	.013	.013	.013
As	<0.05	<.02	<.02	<.02
Ba	0.05	.565	.565	.565
B	3.7	3.8	3.8	3.8
Cd	<0.003			
Cr	<0.030			
Cu	0.063	.01	.01	.01
Fe	0.068	.29	.2	.25
Cs	0.45	.34	.34	.34
Pb	0.043			
Li	3.5	3.1	3.1	3.1
Mn	0.13	<.05	.04	.045
Mo	<0.10	<.002	<.002	<.002
Hg	<0.004	.0021	.0021	.0021
Ag	<0.050			
Br	0.68	.8	.8	.8
Se	<0.050			
Rb	1.2	.9	.76	.83
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.010	.008	.008	.008
Zn	0.028			

*No calculation possible due to breakage

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: LEE HOT SPRINGS-DKY GEOTHERMAL
LOCATION - COUNTY Churchill TOWNSHIP 16 N RANGE 29E
SITE NO. 212, PRIORITY NO. 9

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.2	7.4	7.4	7.4
Cond. (μmhos/cm)		2430	2430	2430
Temperature (°C)	91	88	88	88
Flow (l/min)		130	130	130
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	114.5			
Na	410	450	450	450
K	23	26	26	26
Ca	41	44	44	44
Mg	0.72	.6	.6	.6
SiO_2	161.5	180	180	180
Cl	425	380	380	380
SO_4	26	470	470	470
PO_4	0.12			
TDS	1665			
SS	4.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.37±0.11			
Rn (222)				
Th (230)	≤ 0.16			
Th (232)	< 0.16			
U (234)	≤ 0.05			
U (238)	≤ 0.09			
Pb (210)	< 2.0			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	2.0	.027	.027	.027
As	<0.050	.04	.04	.04
Ba	1.3			
B	0.95	2.4	2.4	2.4
Cd	<0.003			
Cr	<0.030			
Cu	0.31	.01	.01	.01
Fe	0.36	<.02	<.02	<.02
Cs	0.15			
Pb	<0.030			
Li	0.66	.7	.7	.7
Mn	0.059	.08	.08	.08
Mo	<0.10			
Hg	<0.004	0	0	0
Ag	<0.060			
Sr	<0.10	1.0	1.0	1.0
Se	<0.050			
Rb	0.29	.22	.22	.22
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	0.012			
Zn	0.041			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: DARROUGH HOT SPRINGS-MAGNA
LOCATION - COUNTY Nye TOWNSHIP 11N RANGE 43E
SITE NO. 233 , PRIORITY NO. 7

	TRW DATA	HISTORICAL DATA (8)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.2	9.3	8.3	8.7
Cond. (μmhos/cm)		499	472	485
Temperature (°C)	80	101	92	95.5
Flow (l/min)		4335	95	1225
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)		91.7	91.7	91.7
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	142.9			
Na	110	111	111	111
K	2.0	2.9	2.4	2.7
Ca	1.8	13	1.2	5.2
Mg	4.4	3	0	.64
SiO_2	179	106	88	101
Cl	9.8	15	12	13.3
SO_4	36	60	40	51
PO_4	0.0875	.9	.02	.46
TDS	365	390	367	377
Si	3.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.27±0.08			
Rn (222)				
Th (230)	<0.23			
Th (232)	<0.27			
U (234)	<0.12			
U (238)	< 0.08			
Pb (210)	< 2.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (8)		
		MAX	MIN	MEAN
Al	<0.30			
As	0.030	.06	.013	.044
Ba	0.19	<.1	<.1	<.1
B	0.05	.27	.2	.23
Cd	<0.003	<.002	<.002	<.002
Cr	<0.030	<.04	<.04	<.04
Cu	0.18	<.01	<.004	<.006
Fe	<0.030	.08	<.02	.03
Cs	0.06			
Pb	<0.030	<.02	<.02	<.02
Li	0.29	.7	.3	.43
Mn	<0.010	<.02	<.01	<.015
Mo	<0.10			
Hg	0.010	.0004	.0001	.0003
Ag	<0.060	.004	.004	.004
Sr	1.6	.06	.04	.05
Se	0.20	<1.0	.06	.06
Rb	0.04	.06	.03	.04
Ni	<0.015	<.02	<.02	<.02
Sn	<1.0	<.2	<.2	<.2
Be	0.015	<.005	<.005	<.005
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	0.12	<.2	<.2	<.2
Zn	0.010	0.03	0.03	0.03

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: DIXIE HOT SPRINGS
LOCATION - COUNTY Churchill TOWNSHIP 22 N RANGE 35E
SITE NO. 237, PRIORITY NO. 22

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.8	8.6	8.6	8.6
Cond. (μmhos/cm)		914	914	914
Temperature (°C)	69.8	72	72	72
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	106.9			
Na	210	190	190	190
K	5.4	6.5	6.5	6.5
Ca	3.6	3.6	3.6	3.6
Mg	0.077	.02	.02	.02
SiO_2	208	115	115	115
Cl	140	126	126	126
SO_4	65	111	111	111
PO_4	0.0625	.06	.06	.06
TDS	635			
SS	5.0			
S	4.73			
RADIOACTIVITY (in pCi/l)				
Ra (226)	< 0.04			
Rn (222)				
Th (230)	< 0.09			
Th (232)	< 0.09			
U (234)	< 0.10			
U (238)	< 0.10			
Pb (210)	< 0.77			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.30	.015	.015	.015
As	<0.050			
Ba	<0.10			
B	0.7	.89	.89	.89
Cd	<0.003			
Cr	<0.030			
Cu	0.13	<.01	<.01	<.01
Fe	0.034	<.02	<.02	<.02
Cs	0.11			
Pb	<0.030			
Li	0.40	.38	.38	.38
Mn	<0.010	<.02	<.02	<.02
Mo	<0.10			
Hg	<0.004	.001	.001	.001
Ag	<0.060			
Sr	0.018	<.05	<.05	<.05
Se	<0.050			
Rb	0.10	.07	.07	.07
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.010			
Zn	0.019			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: DOUBLE (BLACK ROCK) HOT SPRINGS
LOCATION - COUNTY Humbolt TOWNSHIP 36 N RANGE 26E
SITE NO. 238 , PRIORITY NO. 21

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.6	7.9	7.9	7.9
Cond (µmhos/cm)		902	902	902
Temperature (°C)	76	80	80	80
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	347.5			
Na	180	180	180	180
K	4.0	4.5	4.5	4.5
Ca	4.8	4.6	4.8	4.8
Mg	0.17	.1	.1	.1
SiO_2	164.5	105	105	105
Cl	53.0	59	59	59
SO_4	83	120	120	120
PO_4	0.14	.07	.07	.07
TDS	675			
SS	9.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	<0.07			
Rn (222)				
Th (230)	<0.09			
Th (232)	<0.09			
U (234)	<0.07			
U (238)	<0.14			
Pb (210)	<0.77			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.30	.024	.024	.024
As	<0.050	.06	.06	.06
Ba	<0.10			
B	1.6	1.6	1.6	1.6
Cd	0.004			
Cr	<0.030			
Cu	0.23	.02	.02	.02
Fe	0.048	<.02	<.02	<.02
Cs	<0.07			
Pb	<0.030			
Li	0.07	.06	.06	.06
Mn	<0.010	<.02	<.02	<.02
Mo	<0.10			
Hg	<0.004	.0004	.0004	.0004
Ag	<0.060			
Sr	0.73	.09	.09	.09
Se	<0.050			
Rb	<0.07	<.02	<.02	<.02
Ni	<0.015			
Sb	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
W	<0.010			
Zn	0.013			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: SOU (SEVEN DEVIL GILBERTS) HOT SPRINGS
LOCATION - COUNTY Pershing TOWNSHIP 26 N RANGE 19E
SITE NO. 239, PRIORITY NO. 26

	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.6	8.1	8.1	8.1
Cond. (μmhos/cm)		1407	1407	1407
Temperature (°C)	81.2	73	73	73
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	N.A.			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	262.4	312	312	312
Na	150	165	165	165
K	23	26	26	26
Ca	100	110	110	110
Mg	21	22	22	22
SiO_2	139	65	65	65
Cl	70.0	75	75	75
SO_4	39	370	370	370
PO_4	0.0875			
TDS	940			
SS	3.0			
S	0.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.9±0.6			
Rn (222)				
Th (230)	<0.22			
Th (232)	<0.13			
U (234)	<0.10			
U (238)	<0.14			
Pb (210)	<0.77			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1) MAX	MIN	MEAN
Al	5.9			
As	0.14			
Ba	0.16			
B	3.05			
Cd	<0.003			
Cr	<0.030			
Cu	0.11			
Fe	0.032			
Cs	0.14			
Pb	<0.030			
Li	0.61			
Mn	0.049			
Mo	<0.10			
Hg	<0.0040			
Au	<0.060			
Sr	9.3			
Se	<0.050			
Rb	0.16			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.010			
Zn	0.034			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: MOANA HOT S RINGS
LOCATION - COUNTY Washoe TOWNSHIP 19 N RANGE 19E
SITE NO. 241 , PRIORITY NO. 15

	TRW DATA	HISTORICAL DATA (O)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.7			
Cond. (µmhos/cm)				
Temperature (°C)	62.5			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
N_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	126.4			
Na	155			
K	6.8			
Ca	6.9			
Mg	0.50			
SiO_2	106.0			
Cl	20.0			
SO_4	65			
PO_4	0.12			
TDS	620			
SS	1.0			
S	0.85			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.09±0.03			
Rn (222)				
Th (230)	<0.10			
Th (232)	<0.10			
U (234)	<0.26			
U (238)	<0.14			
Pb (210)	<0.77			

	TRW DATA	HISTORICAL DATA (O)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	6.4			
As	<0.050			
Ba	0.15			
B	0.6			
Cd	<0.003			
Cr	<0.030			
Cu	0.16			
Fe	0.031			
Cs	<0.07			
Pb	<0.030			
Li	0.19			
Mn	0.038			
Mo	<0.10			
Hg	<0.004			
Ag	<0.050			
Sr	0.10			
Se	<0.050			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.010			
Zn	0.018			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: SULPHUR HOT SPRINGS (RUBY VALLEY)
LOCATION - COUNTY: Elko TOWNSHIP ___ RANGE ___
SITE NO. 243 , PRIORITY NO. 24

	TRW DATA	HISTORICAL DATA (3) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.1	7.0	7.0	7.0
Cond. (µmhos/cm)		1760	1760	1760
Temperature (°C)	57	90	90	90
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)		62	62	62
O_2 (%)				
NH_3 (µg/m³)		141	141	141
CH_4 (mg/m³)		663	663	663
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	301.3	1180	1180	1180
Na	70	390	390	390
K	13	41	41	41
Ca	68	49	49	49
Mg	16	13	13	13
SiO_2	51.0	84	84	84
Cl	6.6	40	40	40
SO_4	17	16	16	16
PO_4	0.057	.04	.02	.03
TDS	500			
SS	4.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	2.8±0.8			
Rn (222)				
Th (230)	<0.21			
Th (232)	<0.21			
U (234)	<0.09			
U (238)	<0.09			
Pb (210)	<0.77			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (3) MAX	MIN	MEAN
Al	6.0	.27	.17	.22
As	<0.025			
Ba	1.6			
B	0.55	.77	.77	.77
Cd	<0.003			
Cr	<0.030			
Cu	0.25	<.01	<.01	<.01
Fe	<0.030	<.02	<.02	<.02
Cs	0.06			
Pb	0.030			
Li	0.56	.7	.7	.7
Mn	<0.010	<.02	<.02	<.02
Mo	<0.10			
Hg	<0.010	.0015	.0001	.0008
Ag	<0.060			
Sr	0.90	.1	.05	.075
Se	<0.20			
Rb	0.08	.13	.12	.125
Ni	0.018			
Sn	<1.0			
Be	0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.080			
Zn	0.050			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE NEVADA
SITE NAME BUFFALO VALLEY
LOCATION - COUNTY Lander TOWNSHIP 29 N RANGE 41E
SITE NO 245 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (7)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	6.5	6.5	6.5
Cond (μmhos/cm)		1530	1530	1530
Temperature (°C)	53	72	49	63
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	699.8	813	761	787
Na	300	280	250	269
K	38	36	27	31
Ca	44	45	20	29
Mg	8.8	4.9	4.9	4.9
SiO_2	185	117	64	84
Cl	29.0	34	25	28
SO_4	83	110	109	109.5
PO_4	0.15	.02	.02	.02
TDS	1315	1032	1032	1032
SS	130			
F	0.102			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.28±0.11			
Rn (222)				
Th (230)	<0.19			
Th (232)	<0.13			
U (234)	0.21±0.10			
U (238)	0.28±0.11			
Pb (210)	< 0.77			

	TRW DATA	HISTORICAL DATA (7)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.30	.01	.01	.01
As	0.025	.025	<.01	.013
Ba	0.19	.16	.135	.146
B	1.1	2.1	2.1	2.1
Cd	<0.003			
Cr	<0.030			
Cu	0.73	.08	.08	.08
Fe	0.046	<.25	.05	.12
Cs	0.20	.16	.15	.156
Pb	<0.030			
Li	0.71	.6	.6	.6
Mn	<0.010	.06	.01	.03
Mo	<0.10	.004	<.001	.0016
Hg	0.010	.0001	.0001	.0001
Ag	<0.060			
Sr	1.6	2.4	2.4	2.4
Se	0.20			
Rb	0.19	.18	.124	.14
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	0.080	.057	.022	.036
Zn	0.022			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: LOCKES HOT SPRINGS
LOCATION - COUNTY Nye TOWNSHIP 8 N RANGE 55E
SITE NO. 247 , PRIORITY NO. ALI

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.4			
Cond. (µmhos/cm)				
Temperature (°C)	35			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	301.3			
Na	60			
K	9.5			
Ca	70			
Mg	23			
SiO_2	95.5			
Cl	12.5			
SO_4	42			
PO_4	0.01			
TDS	1485			
SS	4.0			
S	0.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	4.4±1.3			
Rn (222)				
Th (230)	< 0.09			
Th (232)	< 0.09			
U (234)	0.86±0.30			
U (238)	0.24±0.15			
Pb (210)	<0.77			

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	26.0			
As	0.025			
Ba	0.35			
B	1.3			
Cd	<0.003			
Cr	<0.030			
Cu	0.31			
Fe	<0.030			
Cs	0.04			
Pb	0.066			
Li	0.24			
Mn	<0.010			
Mo	<0.10			
Hg	0.010			
Ag	<0.060			
Sr	0.50			
Se	0.20			
Rb	0.05			
Ni	0.024			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.30			
Sb	0.080			
Zn	0.038			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: THE NEEDLES ROCKS (PYRAMID LAKE) -GEYSER
LOCATION - COUNTY Washoe TOWNSHIP ___ RANGE ___
SITE NO. 248 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (0) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.8			
Cond. (μmhos/cm)				
Temperature (°C)	93			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	24.3			
Na	1000			
K	18			
Ca	230			
Mg	40			
SiO_2	96.0			
Cl	2510			
SO_4	37			
PO_4	0.32			
TDS	3915			
SS	2.0			
F	1.53			
RADIOACTIVITY (in pCi/l)				
Ra (226)	2.4±0.7			
Rn (222)				
Th (230)	<0.40			
Th (232)	<0.40			
U (234)	≤0.14			
U (238)	≤ 0.05			
Pb (210)	< 0.86			

	TRW DATA	HISTORICAL DATA (0) MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	3.4			
As	<0.050			
Ba	0.28			
B	4.5			
Cd	<0.003			
Cr	0.035			
Cu	<0.050			
Fe	<0.030			
Cs	0.06			
Pb	0.089			
Li	0.59			
Mn	0.027			
Mo	<0.10			
Hg	<0.004			
Ag	<0.050			
Sr	5.3			
Se	<0.050			
Rb	0.13			
Sb	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.04			
V	<0.30			
Bi	<0.010			
Zn	0.015			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: THE NEEDLES ROCKS (PYRAMID LAKE)
LOCATION - COUNTY Washoe TOWNSHIP ____ RANGE ____
SITE NO. 248 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.3	9.36	8.1	8.6
Cond. (μmhos/cm)		6200	243	4172
Temperature (°C)	65	67	44	56
Flow (l/min)		189	189	189
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)		141	141	141
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	106.9	76	11.0	47.4
Na	1120	1100	50	743
K	45	160	.6	64
Ca	170	282	2.9	204
Mg	0.34	5	.1	1.36
SiO_2	76.0	147	110	100
Cl	2200	2693	6.3	1610
SO_4	45	340	36	243
PO_4	0.087	<.1	.04	.07
TDS	4185	5170	3676	4423
SS	2.0			
S	1.70			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.59±0.18			
Rn (222)				
Th (230)	< 0.37			
Th (232)	<0.37			
U (234)	≤0.11			
U (238)	≤0.06			
Pb (210)	<0.77			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	3.4	.018	.018	.018
As	<0.050	.02	.001	.011
Ba	0.28	.5	.5	.5
B	5.35	6.1	.2	3.15
Cd	0.004	.006	.006	.006
Cr	0.035	<.02	<.02	<.02
Cu	0.19	.01	.01	.01
Fe	<0.030	.02	.02	.02
Cs	0.08			
Pb	<0.089	<.02	<.02	<.02
Li	0.59	.78	.09	.49
Mn	0.026	<.02	<.01	<.015
Mo	<0.10			
Hg	<0.004	<.0001	<.0001	<.0001
Ag	<0.050	<.01	<.01	<.01
Sr	5.3	4.2	.06	2.13
Se	<0.050	<.001	<.001	<.001
Rb	0.14	.8	.19	.49
Ni	<0.015	<.02	<.02	<.02
Sn	<1.0	<.02	<.02	<.02
Be	<0.015	<.005	<.005	<.005
Ti	<0.5			
Tl	0.045			
V	<0.30			
Sb	<0.010	<.1	<.1	<.1
Zn	0.015			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: BOWERS MANSION (WELL)
LOCATION - COUNTY Washoe TOWNSHIP 16 N RANGE 19E
SITE NO. 256 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (0) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.4			
Cond. (μmhos/cm)				
Temperature (°C)	43			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	73.39			
Na	50			
K	0.26			
Ca	2.0			
Mg	<0.05			
SiO_2	112.5			
Cl	3.9			
SO_4	31			
PO_4	0.25			
TDS	415			
SS	3.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.19±0.06			
Rn (222)				
Th (230)	<0.09			
Th (232)	<0.09			
U (234)	0.28±0.15			
U (238)	0.21±0.15			
Pb (210)	<0.86			

	TRW DATA	HISTORICAL DATA (0) MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	3.4			
As	<0.050			
Ba	0.28			
B	<0.05			
Cd	<0.003			
Cr	0.035			
Cu	0.20			
Fe	0.056			
Cs	<0.07			
Pb	<0.089			
Li	0.11			
Mn	<0.010			
Mo	<0.10			
Hg	<0.004			
Ag	<0.060			
Sr	5.3			
Se	<0.050			
Rb	<0.07			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Pt	<0.001			
Zn	0.015			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: BOWER'S MANSION (FRANKTON H.S.)
LOCATION - COUNTY Washow TOWNSHIP 16 N RANGE 19E
SITE NO. 256, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.5	9.36	9.36	9.36
Cond. (µmhos/cm)		243	243	243
Temperature (°C)	43	46	46	46
Flow (l/min)				
GAS ANALYSIS				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	77.76	76	76	76
Na	50	50	50	50
K	0.3	.6	.6	.6
Ca	2.6	2.9	2.9	2.9
Mg	0.11	.2	.2	.2
SiO_2	102	47	47	47
Cl	4.4	6.3	6.3	6.3
SO_4	23	38	38	38
PO_4	0.0375			
TDS	275			
SS	0.2			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	< 0.27			
Rn (222)				
Th (230)	< 0.42			
Th (232)	< 0.42			
U (234)	± 0.13			
U (238)	± 0.06			
Pb (210)	< 0.86			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	3.8			
As	<0.050	.02	.02	.02
Ba	0.30			
B	0.05	.2	.2	.2
Cd	<0.003			
Cr	<0.030			
Cu	0.27	<.01	<.01	<.01
Fe	<0.030	<.02	<.02	<.02
Cs	<0.07			
Pb	0.066			
Li	0.11	.09	.09	.09
Mn	<0.010	<.02	<.02	<.02
Mo	<0.10			
Hg	<0.004	.0002	.0002	.0002
Ag	<0.060			
Sr	3.8			
Se	<0.050			
Rb	<0.07	<.02	<.02	<.02
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.3			
Sb	<0.010			
Zn	0.020			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEVADA
SITE NAME: TREGO
LOCATION - COUNTY ______ TOWNSHIP ____ RANGE ____
SITE NO. 257 , PRIORITY NO. SUBST.

	TRW DATA	HISTORICAL DATA (O)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.0			
Cond. (μmhos/cm)				
Temperature (°C)	78			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	126.4			
Na	430			
K	8.4			
Ca	12			
Mg	0.18			
SiO_2	159.5			
Cl	595			
SO_4	88			
PO_4	0.037			
TDS	1425			
SS	3.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.27±0.08			
Rn (222)				
Th (230)	< 0.33			
Th (232)	< 0.33			
U (234)	±0.11			
U (238)	±0.09			
Pb (210)	<0.86			

	TRW DATA	HISTORICAL DATA (O)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.30			
As	0.16			
Ba	<0.10			
B	4.25			
Cd	<0.003			
Cr	<0.030			
Cu	0.17			
Fe	<0.030			
Cs	<0.07			
Pb	0.12			
Li	0.29			
Mn	<0.010			
Mo	<0.010			
Hg	<0.004			
Ag	<0.060			
Sr	0.58			
Se	<0.050			
Rb	0.10			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.3			
Sb	0.013			
Zn	0.016			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: LOWER FRISCO HOT SPRINGS
LOCATION - COUNTY Catron TOWNSHIP 12 S RANGE 20W
SITE NO. 91 , PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (15)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.8	7.9	6.5	7.46
Cond (µmhos/cm)		1930	180	1011
Temperature (°C)	40	43	35	38
Flow (l/min)		140	46	75
GAS ANALYSIS:				
H_2S (µg/m³)	N/A	<.1	0	0.03
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)		92	92	92
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	118.7	167	121	132
Na	270	333	193	251
K	16	2.3	0.2	14.4
Ca	47	100	11	52
Mg	6.3	2.3	0.0	16
SiO_2	68	85	7	64
Cl	450	512	310	417
SO_4	36	58	39	42
PO_4	0.152	0.02	0.02	0.02
TDS	1045	1086	992	1031
SS	10.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.26±0.08	3.4	3.4	3.4
Rn (222)		1300	1300	1300
Th (230)	<0.26	1.22	1.22	1.22
Th (232)	<0.26	0.1	<0.1	0.1
U (234)	1.1±0.2	1.88	1.88	1.88
U (238)	0.26±0.11	0.47	0.47	0.47
Pb (210)	<0.86			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (15)		
		MAX	MIN	MEAN
Al	<0.50	<2.5	0.02	1.26
As	<0.025	0.018	0.018	0.018
Ba	4.1	<0.7	<0.7	0.7
B	<0.05	200	0	40
Cd	<0.005	<0.01	<0.01	0.01
Cr	<0.080	<0.1	<0.1	0.1
Cu	0.013	<0.1	0.0	0.04
Fe	0.16	3.0	<0.02	0.90
Cs	<0.13	<0.1	<0.1	0.1
Pb	0.12	0.021	0.021	0.021
Li	0.48	0.48	0.310	0.42
Mn	<0.01	>0.1	0.03	0.07
Mo	<0.30	<0.5	<0.5	0.5
Hg	<0.010	0.0012	0.0012	0.0012
Ag	<0.030	<0.03	<0.03	<0.03
Sr	0.38	0.33	0.33	0.33
Se	<0.20	0.006	0.006	0.006
Rb	0.20	0.08	0.08	0.08
Ni	<0.030	<0.03	<0.02	0.03
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.010	<0.5	<0.5	<0.5
Zn	0.028			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: RADIUM HOT SPRINGS
LOCATION - COUNTY Doña Ana TOWNSHIP 21S RANGE 1W
SITE NO. 92, PRIORITY NO. 3

	TRW DATA	HISTORICAL DATA (11)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.0	8.33	6.7	7.4
Cond. (μmhos/cm)		6210	5540	5968
Temperature (°C)	82	52	35	44
Flow (l/min)		38	38	38
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)		71	71	71
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	**259.5**	**480**	**253**	**414.5**
Na	940	1373	1100	1146
K	140	170	111	154
Ca	120	142	65	122
Mg	13	23	11	**14.9**
SiO_2	61.5	78	52	69
Cl	1800	2100	1600	1697
SO_4	**95**	806	208	351
PO_4	0.4125	1.4	0	0.7
TDS	3440			
SS	3.8			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.87±0.26**	0.74	0.6	0.67
Rn (222)		5800	5800	5800
Th (230)	**<0.33**	0.92	0.92	0.92
Th (232)	**<0.23**	< 0.1	<0.1	0.1
U (234)	**0.19±0.11**	0.32	0.32	0.32
U (238)	**0.10±0.11**	0.10	0.10	0.10
Pb (210)	**<0.86**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (11)		
		MAX	MIN	MEAN
Al	<0.50	0.1	0	0.02
As	0.025	0.009	0.009	0.009
Ba	9.7	0.0	0.0	0.0
B	0.6	1.06	0.32	0.69
Cd	<0.005			
Cr	<0.080			
Cu	0.050	<0.01	0.0	0.01
Fe	0.14	91	<0.02	13.23
Cs	<0.13	0.1	0.1	0.1
Pb	0.094	1.2	1.2	1.2
Li	1.0	161	<0.02	35
Mn	0.02	0.4	0.1	0.26
Mo	<0.30			
Hg	0.010	<0.0001	<0.0001	0.0001
Ag	<0.030			
Sr	2.9			
Se	<0.20	0	0	0
Rb	1.9	1.3	1.3	1.3
Ni	<0.030	0.02	0.02	0.02
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	<0.040			
V	<0.50			
Sb	<0.080			
Zn	**0.11**	**0.25**	0.08	0.17

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: FAYWOOD WARM SPRINGS
LOCATION - COUNTY Grant TOWNSHIP 20 S RANGE 11W
SITE NO. 93, PRIORITY NO. 6

	TRW DATA	HISTORICAL DATA (8) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.42	8.7	6.95	7.6
Cond. (μmhos/cm)		608	504	580
Temperature (°C)	51	58.8	40	51
Flow (l/min)		78	57	67
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	**247.1**	**292**	**197**	**257**
Na	80	100	79	89
K	80	11	7.1	8.3
Ca	39	38	14	33
Mg	8.0	9.1	6.3	7.6
SiO_2	33	67	39	47
Cl	24.5	22	14.2	17.3
SO_4	32	76	49	51
PO_4	0.225	0.1	0	0.03
TDS	370	492	339	400
SS	0.7			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**21±6**	16	16	16
Rn (222)		5600	5600	5600
Th (230)	**<0.18**	0.81	0.81	0.81
Th (232)	**<0.18**	<0.1	<0.1	0.1
U (234)	**0.18±0.10**	0.09	0.09	0.09
U (238)	**≤0.09**	<0.1	<0.1	0.1
Pb (210)	**1.2±1.1**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (8) MAX	MIN	MEAN
Al	<0.50	3.2	0	1.08
As	<0.025	0.011	0.009	0.056
Ba	5.0	<0.2	<0.2	0.2
B	<0.05	0.26	0	0.11
Cd	<0.005	<0.02	<0.02	0.02
Cr	<0.040	<0.1	<0.1	0.1
Cu	<0.010	<0.12	<0.12	0.12
Fe	0.08	0.24	0.00	0.05
Cs	<0.10			
Pb	0.094	0.014	0.014	0.014
Li	0.14	0.19	0.07	0.11
Mn	0.02	0.15	0.000	0.051
Mo	<0.30	<0.45	<0.45	0.45
Hg	<0.010	0.0004	0.0004	0.0004
Ag	<0.030	<0.07	<0.07	0.07
Sr	0.47	0.02	0.02	0.02
Se	<0.20	0.005	0	0.003
Rb	0.25			
Ni	0.032	<0.13	<0.13	0.13
Sn	<1.0			
Be	<0.011			
Ti	<0.5			
Tl	<0.040			
V	<0.050			
Sb	<0.080	<0.6	<0.6	0.6
Zn	0.025			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: GILA HOT SPRINGS
LOCATION - COUNTY Grant TOWNSHIP 13 S RANGE 13W
SITE NO. 94, PRIORITY NO. 4

	TRW DATA	HISTORICAL DATA (9)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.4	8.6	7.5	8.1
Cond (umhos/cm)		653	550	615
Temperature (°C)	60	66	27	56
Flow (l/min)		310	95	237
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)		70	35	47
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	108	109	96	102
Na	120	140	120	127
K	3.2	3.6	2.91	3.24
Ca	11	20	9.9	12
Mg	0.2	0.2	0	0.1
SiO_2	60.5	100	33	69
Cl	90.0	106	0	87
SO_4	28	97	40	59
PO_4	0.1625	0.17	0	0.1
TDS	450	468	369	415
SS	5.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.08±0.07	0.29	0.29	0.29
Rn (222)		660	660	660
Th (230)	<0.32	0.87	0.87	0.87
Th (232)	<0.32	<0.16	<0.16	0.16
U (234)	0.77±0.19	1.01	1.01	1.01
U (238)	0.51±0.15	0.54	0.54	0.54
Pb (210)	<1.9			

	TRW DATA	HISTORICAL DATA (9)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.50	<1.1	0	0.29
As	0.025	0.011	0.007	0.009
Ba	1.1	121	<0.2	61
B	<0.05	0.19	0.03	0.10
Cd	<0.005	<0.02	0.0002	0.01
Cr	<0.080	<0.1	0.003	0.05
Cu	0.022	<0.12	0.0065	0.05
Fe	0.06	<0.1	0.0	0.04
Ga	<0.13	<0.1	<0.1	0.1
Pb	0.093	0.024	0.005	0.01
Li	0.23	0.32	0.03	0.22
Mn	<0.01	0.42	0.0	0.12
Mo	<0.30	<0.45	<0.45	<0.45
Hg	<0.010	0.0033	<0.0001	0.001
Ag	<0.030	<0.07	<0.07	0.07
Sr	0.14	0.02	0.02	0.02
Se	<0.20	0.005	0	0.003
Rb	<0.13	0.02	0.02	0.02
Ni	<1.0	<0.13	0.06	0.06
Sn	<1.0			
Sb	<0.010			
Ti	<0.5			
Tl	0.072			
V	<0.50			
W	<0.060	<0.6	<0.6	0.6
Zn	0.041	0.06	<0.01	0.025

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: OJO CALIENTE (IRON SPRING)
LOCATION - COUNTY Taos Rio Arriba TOWNSHIP 24 N RANGE 8E
SITE NO. 97 , PRIORITY NO. 7

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.0	9.09	6.6	7.25
Cond. (μmhos/cm)		3900	3300	3600
Temperature (°C)	41	43	43	43
Flow (l/min)				
GAS ANALYSIS				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1017	2073	1052	1962
Na	880	993	890	954
K	32	36	31.5	33.8
Ca	22	29	6	16
Mg	8.2	8.5	7.7	8.1
SiO_2	55.5	71	55	63
Cl	330	270	237	251
SO_4	56	149	132	141
PO_4	0.0475	0.06	0.06	0.06
[illegible]	2655	2320	2320	2320
[illegible]	8.0			
[illegible]	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	12±4	38	38	38
Rn (222)		9400	9400	9400
Th (230)	<0.17	1.56	1.56	1.56
Th (232)	<0.17	<0.25	<0.25	0.25
U (234)	9.4±0.8	9.01	9.01	9.01
U (238)	2.3±0.4	1.72	1.72	1.72
Pb (210)	<0.86			

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	8.7	0.03	0.03	0.03
As	<0.025	0.06	0.06	0.06
Ba	1.3			
B	1.6	1.5	1.0	1.2
Cd	<0.003			
Cr	<0.030			
Cu	<0.060			
Fe	<0.01	0.57	0.06	0.32
Cs	0.11			
Pb	<0.030			
Li	3.2	4.3	2.7	3.4
Mn	<0.01	0.15	0.15	0.15
Mo	<0.10			
Hg	<0.010			
Ag	<0.060			
Sr	1.2			
Se	<0.20	0.046	0.046	0.046
Rb	0.50			
Sb	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.3			
W	<0.080			
Zn	0.025			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: JEMEZ HOT SPRINGS (OJOS CALIENTES)
LOCATION - COUNTY Sandoval TOWNSHIP 18N RANGE 2E
SITE NO. 100. PRIORITY NO. 5

	TRW DATA	HISTORICAL DATA (11) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.4	8.51	6.5	7.3
Cond. (µmhos/cm)		3860	300	3219
Temperature (°C)	54	66	44	59
Flow (l/min)		95	95	95
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	**597**	**750**	**220**	**655**
Na	640	722	408	599
[illegible]	74	160	62.6	91.5
Ca	62	139	124	**134**
Mg	4.7	10.1	2.36	6.7
SiO_2	88	896	62	172
Cl	980	930	795	857
SO_4	**19**	55	42	48
PO_4	1.65	33	<0.022	1.28
TDS	2160	**2364**	1983	2160
SS	8			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**10±3**	8.6	8.6	8.6
Rn (222)		220	220	220
Th (230)	**<0.18**	1.85	1.85	1.85
Th (232)	**<0.18**	<0.1	<0.1	0.1
U (234)	**≤0.09**	0.07	0.07	0.07
U (238)	**≤0.24**	0.05	0.05	0.05
Pb (210)	**~0.86**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (11) MAX	MIN	MEAN
Al	<0.50	14	[illegible]	3.3
As	<0.025	0.74	0.1	0.25
Ba	4.4	0.16	0.16	0.16
B	**7.45**	15.3	5.9	8.2
Cd	<0.005	<0.01	<0.01	0.01
Cr	<0.080	<0.001	<0.001	0.001
Cu	0.019	<0.008	<0.008	0.008
Fe	0.07	0.34	[illegible]	0.1
Cs	0.46			
Pb	[illegible]	<0.003	<0.003	0.003
Li	8.6	11.3	6.87	8.6
Mn	0.05	0.26	0.16	0.20
Mo	<0.30	<0.001	<0.001	0.001
Hg	<0.010			
Ag	<0.030			
Sr	0.72	0.67	0.67	0.67
Se	<0.20	0.05	0.05	0.05
Rb	1.3			
Ni	<0.030	<0.002	<0.002	0.002
Sn	<1.0	<0.034	<0.034	0.034
Be	<0.010	0.0008	0.0008	0.0008
Ti	<0.5	<0.005	<0.005	0.005
Tl	<0.040			
V	<0.50	<0.034	<0.034	0.034
Sb	<0.080	<0.0005	<0.0005	0.0005
Zn	**0.025**	**<0.022**	**<0.022**	**0.022**

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: SODA DAM SPRING
LOCATION - COUNTY Sandoval TOWNSHIP 16 N RANGE 2E
SITE NO. 101, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (9)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.2	8.68	6.1	7.2
Cond. (μmhos/cm)		6400	5000	5922
Temperature (°C)	33	46	32	37
Flow (l/min)		234	234	234
GAS ANALYSIS:				
H_2S (ppm)	N/A	0.70	0.70	0.70
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (mg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1220	1580	405	1070
Na	940	1030	796	917
K	170	220	164	161
Ca	22	399	145	277
Mg	25	25.8	11	19.3
SiO_2	35.5	50	39.0	44.5
Cl	1990	2020	1440	1611
SO_4	23	52	34	40
PO_4	0.419	0.61	0.26	0.50
TDS	3625	4000	3640	3815
SS	1.4			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	81±24	140	140	140
Rn (222)		450	450	450
Th (230)	<0.17	1.05	1.05	1.05
Th (232)	<0.17	<0.12	<0.12	0.12
U (234)	0.52±0.13	0.82	0.82	0.82
U (238)	0.27±0.10	0.38	0.38	0.38
Pb (210)	<0.86			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (9)		
		MAX	MIN	MEAN
Al	<0.50	0.475	0.005	0.14
As	0.025	11	0.003	3.76
Ba	16	0.34	0.34	0.34
B	6.65	24.5	11.2	15.3
Cd	<0.004	0.01	0.00008	0.01
Cr	<0.080	0.0043	0.001	0.002
Cu	0.034	0.02	0.011	0.014
Fe	0.08	0.29	0.04	0.16
Cs	1.2	2	<0.1	1.0
Pb	0.13	<0.1	0.001	0.04
Li	1.3	17.5	11.8	13.7
Mn	0.37	0.60	0.5	0.54
Mo	<0.040	0.001	0	0.001
Hg	<0.010	<0.001	<0.001	0.001
Ag	<0.030	0.002	0.002	0.002
Sr	1.6	2.2	2.2	2.2
Se	<0.20	0.16	0.000	0.06
Rb	3.1	1.4	<0.04	1.22
Ni	<0.030	<0.05	<0.002	0.03
Sn	<1.0	<0.058	<0.058	0.058
Be	<0.010	0.002	0.002	0.001
Ti	<0.5	0.005	0.005	0.005
Tl	<0.040			
V	<0.50	<0.056	<0.056	<0.056
W	<0.080			<0.0005
Zn	0.031	0.022	0.00004	0.011

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: NEW MEXICO
SITE NAME: TRUTH OR CONSEQUENCES (YUCCA LODGE)
LOCATION - COUNTY Sierra TOWNSHIP 13 S RANGE 4W
SITE NO. 251 , PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.1	7.5	7.2	7.4
Cond. (µmhos/cm)		4590	4290	4440
Temperature (°C)	40	43	43	43
Flow (l/min)		32	32	32
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	240.0	228	212	220
Na	660	751	678	715
K	62	61	36	49
Ca	150	174	146	161
Mg	18	36	14	25
SiO_2	32	41	36	39
Cl	1550	1310	1210	1260
SO_4	88	98	79	89
PO_4	0.202			
TDS	2690	2670	2416	2544
SS	1.2			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.35±0.10			
Rn (222)				
Th (230)	<0.45			
Th (232)	<0.26			
U (234)	2.5±0.3			
U (238)	0.82±0.16			
Pb (210)	<0.86			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.50			
As	<0.025			
Ba	6.4			
B	<0.05			
Cd	<0.005			
Cr	<0.080			
Cu	0.050			
Fe	0.08	[illegible]	[illegible]	[illegible]
Cs	<0.10			
Pb	0.09			
Li	0.80			
Mn	0.01			
Mo	<0.30			
Hg	0.004			
Ag	<0.030			
Sr	5.1			
Se	<0.20			
Rb	0.80			
Ni	0.037			
Sn	<1.0			
Be	<0.010			
Ti	<0.5			
Tl	0.080			
V	<0.50			
Sb	<0.080			
Zn	0.041			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: HUNTER'S LODGE (LAKEVIEW)
LOCATION - COUNTY Lake TOWNSHIP 39 S RANGE 20E
SITE NO. 120 , PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (2) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.8	8.5	7.77	8.14
Cond. (µmhos/cm)		1120	1120	1120
Temperature (°C)	78	96	93	94.5
Flow (l/min)		2300	2300	2300
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	6?.4	79	79	79
Na	185	210	210	210
K	8.5	8.5	8.5	8.5
Ca	14.0	13	13	13
Mg	<0.07	<.1	<.1	<.1
SiO_2	172	140	140	140
Cl	122	120	120	120
SO_4	47	260	260	260
PO_4	0.44	.08	.08	.08
TDS	840			
SS	0.8			
S	0.884			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.94±0.28	.194	.066	.11
Rn (222)		69	41	34.5
Th (230)	<0.39	<.027	<.027	<.027
Th (232)	<0.39	<.013	<.013	<.013
U (234)	<0.05	<.019	<.019	<.019
U (238)	<0.06	<.014	<.014	<.014
Pb (210)	<0.86			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2) MAX	MIN	MEAN
Al	<0.02	.034	.034	.034
As	0.09	.06	.06	.06
Ba	0.625			
B	[illegible]	[illegible]	[illegible]	[illegible]
Cd	0.0002			
Cr	0.066			
Cu	0.001			
Fe	<0.0005			
[illegible]	<0.07			
Pb	<0.015			
[illegible]	0.13	.13	.13	.13
Mn	0.002	<[illegible]	<[illegible]	<[illegible]
Mo	<0.02			
Hg	0.004	.0004	.0004	.0004
[illegible]	0.001			
[illegible]	0.51	[illegible]	[illegible]	[illegible]
[illegible]	0.03			
[illegible]	0.08	.04	.04	.04
Ni	0.218			
Sr	2.5			
[illegible]	0.25			
[illegible]	0.096			
[illegible]	<0.03			
[illegible]	<0.05			
[illegible]	0.012			
Zn	0.088			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: BARRY'S RANCH (LAKEVIEW)
LOCATION - COUNTY Lake TOWNSHIP 39S RANGE 20E
SITE NO. 121, PRIORITY NO. 3

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2	8.27	7.78	8.0
Cond. (μmhos/cm)		1370	1370	1370
Temperature (°C)	79	88	74	81
Flow (1/min)		200	200	200
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)		2	2	2
O_2 (%)				
NH_3 (μg/m³)		28000	28000	28000
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/1)				
Alkalinity (mg/1 as $CaCO_3$)	[illegible]			
Na	240	280	280	280
K	8.0	9	9	9
Ca	13.0	8.8	8.8	8.8
Mg	< 0.07	.1	.1	.1
SiO_2	143.5	130	130	130
[illegible]	180	170	170	170
SO_4	100	240	240	240
PO_4	0.20	.06	.06	.06
TDS	1315			
SS	13.2			
S	5.84			
RADIOACTIVITY (in pCi/1)				
Ra (226)	0.35±0.10	.115	.029	.072
Rn (222)				
Th (230)	<0.11	<.017	<.017	<.017
Th (232)	<0.07	<.017	<.017	<.017
U (234)	<0.15	<.015	<.015	<.015
U (238)	<0.12	<.0079	<.0079	<.0079
Pb (210)	<1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/1)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.02	.014	.014	.014
As	0.01	.07	.07	.07
Ba	0.226			
B	15.3	11.2	11.2	11.2
Cd	0.0002			
Cr	0.075			
Cu	0.001	<.01	<.01	<.01
Fe	<0.0005	<.02	<.02	<.02
[illegible]	<0.07			
[illegible]	<0.015			
[illegible]	0.14	.11	.11	.11
Mn	0.023	<.02	<.02	<.02
Mo	<0.02			
Hg	0.005	.0017	.0017	.0017
Ag	0.002			
[illegible]	1.88	11	11	11
Se	0.05			
Rb	<0.07	.04	.04	.04
Ni	0.069			
[illegible]	3.25			
Br	0.10			
Ti	0.045			
[illegible]	<0.03			
V	<0.05			
[illegible]	0.005			
Zn	0.007			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: BREITENBUSH HOT SPRINGS
LOCATION - COUNTY Marion TOWNSHIP 9 S RANGE 7E
SITE NO. 138, PRIORITY NO. 4

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.5	7.31	7.31	7.31
Cond. (µmhos/cm)		4030	4030	4030
Temperature (°C)	78	92	92	92
Flow (l/min)		3400	3400	3400
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	142.1	142	142	142
Na	600	720	720	720
K	27	31	31	31
Ca	103	100	100	100
Mg	1.3	1.3	1.3	1.3
SiO_2	188	83	83	83
Cl	1240	1300	1300	1300
SO_4	41	140	140	140
PO_4	0.40	.06	.06	.06
TDS	2370			
SS	1.6			
F	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.72±0.22			
Rn (222)				
Th (230)	<0.23			
Th (232)	<0.23			
U (234)	<0.05			
U (238)	<0.05			
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	0.09	.51	.51	.51
Ba	<0.02			
B	3.7	4.1	4.1	4.1
Cd	0.016			
Cr	0.039	.01	.01	.01
Cu	0.004	.02	.02	.02
Fe	0.022			
Cs	0.10			
Pb	<0.015	[illegible]	[illegible]	[illegible]
Li	1.6	.22	.22	.22
Mn	0.13			
Mo	<0.02	.0002	.0002	.0002
Hg	0.003			
Ag	0.007	.73	.73	.73
Sr	0.33			
Se	0.08	.16	.16	.16
Rb	0.18			
Ni	0.005			
Sn	3.25			
Be	0.043			
Ti	<0.08			
Tl	<0.03			
V	<0.05			
W	0.036			
Zn	0.026			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: MICKEY HOT SPRING
LOCATION - COUNTY Harney TOWNSHIP 33S RANGE 3 SE
SITE NO. 180 , PRIORITY NO. 6

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.3	8.05	8.05	8.05
Cond (μmhos/cm)		2490	2490	2490
Temperature (°C)	67	73	73	73
Flow (l/min)		100	100	100
GAS ANALYSIS:				
H_2S (μg/m³)	0			
CO (mg/m³)				
CO_2 (%)		23	23	
O_2 (%)				
NH_3 (μg/m³)	7			
CH_4 (mg/m³)		663	663	663
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity, (mg/l as $CaCO_3$)	318.3	785	785	785
Na	520	550	550	550
K	30	35	35	350
Ca	1.3	.9	.9	.9
Mg	0.11	.1	.1	.1
SiO_2	243	200	200	200
Cl	280	240	240	240
SO_4	360	230	230	230
PO_4	0.087			
TDS	1685			
SS	10			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.13±0.04			
Rn (222)	*			
Th (230)	<0.18			
Th (232)	<0.12			
U (234)	<0.05			
U (238)	<0.011			
Pb (210)	<1.0			

*No radon due to breakage

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.30	.058	.058	.058
As	0.10	.01	.01	.01
Ba	<0.10			
B	11.6	12.5	10.5	11.6
Cd	<0.003			
Cr	<0.030			
Cu	0.16	.06	.06	.06
Fe	0.066	<.02	<.02	<.02
[illegible]	0.14			
[illegible]	<0.030			
Li	1.00	1.1	1.1	1.1
Mn	<0.010	<.02	<.02	<.02
Mo	<0.10			
Hg	<0.004	.0001	.0001	.0001
Ni	<0.050			
Sr	0.20	15	15	15
Se	<0.050			
Rb	0.23	.2	.2	.2
[illegible]	<0.015			
[illegible]	<1.0			
[illegible]	<0.015			
[illegible]	<0.5			
[illegible]	<0.040			
[illegible]	<0.30			
Sb	0.057			
Zn	0.010			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: KLAMATH FALLS
LOCATION - COUNTY Klamath TOWNSHIP 38S RANGE 9 E
SITE NO. 181, PRIORITY NO. 1

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.7			
Cond. (μmhos/cm)	1200			
Temperature (°C)	88			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	49.54			
Na	170			
K	4.3			
Ca	27			
Mg	0.10			
SiO_2	600			
Cl	54			
SO_4	820			
PO_4	0.22			
TDS	780			
[illegible]	0.40			
[illegible]	0.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	< 0.29±0.09			
Rn (222)				
Th (230)	< 0.22			
Th (232)	< 0.22			
U (234)	< 0.03			
U (238)	< 0.03			
Pb (210)	< 1.0			

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	< 0.02			
As	0.01			
Ba	0.228			
B	0.6			
Cd	0.0004			
Cr	0.141			
Cu	0.002			
Fe	0.014			
Cs	< 0.07			
Pb	< 0.015			
Li	0.11			
Mn	0.012			
Mo	< 0.02			
Hg	0.141			
Ag	0.002			
Sr	0.96			
Se	0.02			
Rb	< 0.07			
[illegible]	0.273			
[illegible]	1.67			
Be	< 0.002			
[illegible]	< 0.08			
[illegible]	< 0.01			
[illegible]	< 0.05			
[illegible]	0.017			
Zn	0.009			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: VALE HOT SPRINGS
LOCATION - COUNTY Malheur TOWNSHIP 18S RANGE 45E
SITE NO. 182 , PRIORITY NO. 7

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.45	7.47	7.47	7.47
Cond. (µmhos/cm)		1530	1530	1530
Temperature (°C)	81.3	73	73	73
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	116.6	143	143	143
Na	290	310	310	310
K	12	16	16	16
Ca	19	19	19	19
Mg	0.44	.8	.8	.8
SiO_2	107.5	130	130	130
Cl	400	360	360	360
SO_4	71	100	100	100
PO_4	0.14			
TDS	940			
SS	40			
S	3.82			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.12±0.04			
Rn (222)				
Th (230)	< 0.21			
Th (232)	< 0.21			
U (234)	< 0.07			
U (238)	< 0.06			
Pb (210)	< 1.0			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	0.40	.017	.017	.017
As	< 0.050			
Ba	< 0.10			
B	9.1	9.4	9.4	9.4
Cd	< 0.003			
Cr	< 0.030			
Cu	0.24	< .01	< .01	< .01
Fe	0.045	< .02	< .02	< .02
Cs	< 0.07			
Pb	< 0.030			
Li	0.32	.28	.28	.28
Mn	0.028	.04	.04	.04
Mo	< 0.10			
Hg	< 0.004			
Ag	< 0.050			
Sr	0.43			
Se	< 0.050			
Rb	0.11	.09	.09	.09
Ni	< 0.015			
Sn	< 1.0			
Be	< 0.015			
Ti	< 0.5			
Tl	< 0.040			
U	< 0.30			
Sb	< 0.010			
Zn	0.015			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE OREGON
SITE NAME CRUMP'S SPRING (Charlie Crump)
LOCATION - COUNTY Lake TOWNSHIP 38S RANGE 24 E
SITE NO. 183. PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.0	7.26	7.26	7.26
Cond. (umhos/cm)	**1900**	1490	1490	1490
Temperature (°C)	61	78	78	78
Flow (l/min)		25	25	25
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)		14	14	14
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)		3978	3978	3978
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	138.4	**153**	**153**	**153**
Na	**265**	280	280	280
K	**15**	11	11	11
Ca	**16**	16	16	16
Mg	**0.20**	.2	.2	.2
SiO_2	225	180	180	180
Cl	**305**	240	240	240
SO_4	**56**	200	200	200
PO_4	**0.36**	.19	.19	.19
TDS	1235			
SS	**0.8**			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**0.23±0.07**			
Rn (222)				
Th (230)	**<0.23**			
Th (232)	**<0.23**			
U (234)	**≤0.10**			
U (238)	**≤ 0.16**			
Pb (210)	**<1.0**			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	1.37	.017	.017	.017
As	0.94	.46	.46	.46
Ba	0.313			
B	19.8	13.6	13.6	13.6
Cd	0.0008			
Cr	0.042			
Cu	0.002	<.01	<.01	<.01
Fe	**0.050**	<.02	<.02	<.02
Cs	**0.08**			
Pb	< 0.015			
Li	**0.38**	.4	.4	.4
Mn	**0.035**	.03	.03	.03
Mo	< 0.02			
Hg	0.004	.0004	.0004	.0004
Ag	0.007			
Sr	0.46	.12	.12	.12
Se	0.08			
Rb	**0.10**	.07	.07	.07
Ni	0.125			
Sn	1.25			
Be	0.10			
Ti	< 0.08			
Tl	0.03			
[illegible]	< 0.05			
Sb	0.027			
Zn	0.014			

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STATE: OREGON
SITE NAME ALVORD (INDIAN) HOT SPRINGS
LOCATION – COUNTY Harney TOWNSHIP 34 S RANGE 34E
SITE NO. 184 , PRIORITY NO. 5

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.3	6.73	6.73	6.73
Cond. (μmhos/cm)		4590	4590	4590
Temperature (°C)	76	76	76	76
Flow (l/min)		500	500	500
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1440	1196	1196	1196
Na	930	960	960	960
K	50	69	69	69
Ca	14	13	13	13
Mg	1.9	2.2	2.2	2.2
SiO_2	162.0	120	120	120
Cl	900	780	780	780
SO_4	65	220	220	220
PO_4	0.125	.14	.14	.14
TDS	3150			
[illegible]	10			
[illegible]	0.17			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.61±0.18			
Rn (222)				
Th (230)	<0.09			
Th (232)	<0.09			
U (234)	≤0.13			
U (238)	≤0.07			
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	0.50	.003	.003	.003
As	< 0.050	.04	.04	.04
Ba	0.20			
B	34.0	30	30	30
Cd	0.004			
Cr	< 0.030			
Cu	0.15	.05	.05	.05
Fe	0.18	.12	.12	.12
Cs	0.18			
Pb	< 0.030			
Li	2.1	2.1	2.1	2.1
Mn	0.034	.02	.02	.02
Mo	< 0.10			
Hg	< 0.004	.0001	.0001	.0001
Ag	< 0.050			
Sr	0.98	.92	.92	.92
Se	< 0.050			
Rb	0.40	.33	.33	.33
Ni	< 0.015			
Sn	< 1.0			
Be	< 0.015			
[illegible]	< 0.5			
Ti	< 0.030			
V	< 0.30			
Sb	0.17			
Zn	0.030			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: OREGON
SITE NAME: HOT LAKE (ALVORD DESERT)
LOCATION - COUNTY Harney TOWNSHIP 37S RANGE 33E
SITE NO. 185 , PRIORITY NO. 8

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.5	7.26	7.26	7.26
Cond. (µmhos/cm)		2410	2410	2410
Temperature (°C)	82.22	36	36	36
Flow (l/min)		3500	3500	3500
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	335.3	420	420	420
Na	410	500	500	500
K	26	31	31	31
Ca	18	16	16	16
Mg	0.44	.3	.3	.3
SiO_2	177.5	190	190	190
Cl	320	300	300	300
SO_4	37	350	350	350
PO_4	0.12	.29	.29	.29
TDS	1515			
SS	7.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.26±0.08			
Rn (222)				
Th (230)	<0.31			
Th (232)	<0.31			
U (234)	≤0.09			
U (238)	≤0.05			
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	< 0.30			
As	0.080	.01	.01	.01
Ba	< 0.10			
B	13.3	16.6	16.6	16.6
Cd	<0.003			
Cr	< 0.030			
Cu	0.21	.03	.03	.03
Fe	0.064	< .02	< .02	< .02
Cs	0.17			
Pb	< 0.030			
Li	0.58	.65	.65	.65
Mn	0.12	.03	.03	.03
Mo	<0.10			
Hg	< 0.004	.0004	.0004	.0004
Ag	< 0.050			
Sr	0.45	.42	.42	.42
Se	<0.050			
Rb	0.25	.23	.23	.23
Ni	< 0.015			
Sn	<1.0			
Be	<0.015			
Ti	< 0.5			
Tl	< 0.040			
V	< 0.30			
[illegible]	0.046			
Zn	0.015			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: THERMO HOT SPRINGS
LOCATION - COUNTY: Beaver TOWNSHIP 30 S RANGE 12W
SITE NO. 122 , PRIORITY NO. 8

	THW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2	7.98	7.25	7.6
Cond. (µmhos/cm)				
Temperature (°C)	57	89.5	73	84
Flow (l/min)		500	500	500
GAS ANALYSIS:				
H_2S (mg/m^3)	N/A			
[illegible] (mg/m^3)				
CO_2		84	84	84
[illegible]				
[illegible] (mg/m^3)		71	71	71
CH_4 (mg/m^3)		<66	<66	<66
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	297.1			
[illegible]	370	400	380	390
[illegible]	52	52	52	52
[illegible]	66	71	71	71
Mg	13	10	10	10
SiO_2	118	113	113	113
Cl	248	225	0	113
SO_4	610	480	480	480
[illegible]	0.12			
TDS	1470	1700	1700	1700
[illegible]	1.0			
[illegible]	1.56			
RADIOACTIVITY (in pCi/l)				
Ra (226)	4.3±1.3			7.5
Rn (222)		600	600	600
Th (230)	<0.11	<0.019	<0.019	0.019
Th (232)	<0.11	<0.023	<0.023	0.023
U (234)	≤0.13	0.033	0.033	0.033
U (238)	≤0.05	<0.018	<0.018	0.018
Pb (210)	<1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	THW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
Al	<0.30	0.003	0.003	0.003
As	0.075			
Ba	0.46			
B	1.4	0.93	0.93	0.93
Cd	<0.003			
Cr	<0.030			
Cu	0.21	<0.01	<0.01	0.01
Fe	0.083	0.02	0.02	0.02
[illegible]	0.14	0.2	0.2	0.2
[illegible]	<0.030			
Li	1.2	1.3	1.3	1.3
Mn	<0.010	0.02	0.02	0.02
Mo	0.10			
Hg	<0.010	<0.0001	<0.0001	<0.0001
Ag	<0.060			
[illegible]	0.75			
[illegible]	<0.20			
[illegible]	0.60	0.5	0.5	0.5
[illegible]	0.025	<0.02	<0.02	<0.02
[illegible]	<1.0			
[illegible]	0.015			
[illegible]	<1.5			
[illegible]	<0.040			
[illegible]	<0.30			
[illegible]	<0.080			
Zn	0.044	<0.01	<0.01	<0.01

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: CRYSTAL (MASDEN'S) HOT SPRING
LOCATION - COUNTY: Box Elder TOWNSHIP: 11 N RANGE: 2W
SITE NO. 123 , PRIORITY NO. 10

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.5	7.3	6.1	6.7
Cond. (μmhos/cm)				
Temperature (°C)	49	58	54	56
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	382.7	216	216	216
Na	13000	405	405	405
K	520	55	55	55
Ca	590	141	141	141
Mg	160			
SiO_2	40.5	50	50	50
Cl	22500	337	337	337
SO_4	400	378	378	378
PO_4	0.0375	216	216	216
TDS	39400			
SS	6.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	170±50	410	410	410
Rn (222)		1800	1800	1800
Th (230)	<0.15	0.043	0.043	0.043
Th (232)	<0.15	0.022	0.022	0.022
U (234)	0.89±0.24	0.96	0.96	0.96
U (238)	0.35±0.15	0.3	0.3	0.3
Pb (210)	3.9±1.2			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	0.50			
As	0.030			
Ba	1.30			
B	2.85			
Cd	<0.001			
Cr	0.12			
Cu	<0.060			
Fe	0.041			
Cs	0.08			
Pb	0.079			
Li	2.7			
Mn	0.054			
Mo	<0.10			
Hg	<0.010			
Ag	<0.060			
Sr	9.8			
Se	<0.20			
Rb	1.7			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Tl	<0.5			
Ti	0.24			
[illegible]	<0.3			
Sb	<0.080			
Zn	0.022			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: STINKING HOT SPRING
LOCATION - COUNTY Box Elder TOWNSHIP 10 N RANGE 3W
SITE NO. 124 , PRIORITY NO. ALT.

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.7	7.02	6.5	6.76
Cond (µmhos/cm)				
Temperature (°C)	44	47	16.7	31.85
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	471.2	537	537	537
Na	8800	433	433	433
K	96	20	20	20
Ca	740	256	256	256
Mg	250	89	89	89
SiO_2	139			
Cl	17250	641	641	641
SO_4	39	587	587	587
PO_4	0.057			
TDS	32685	2572	2572	2572
SS	15.0			
[illegible]	21.4			
RADIOACTIVITY (in pCi/l)				
Ra (226)	8.0±2.4	80	80	80
Rn (222)		880	880	880
Th (230)	<0.11	0.021	0.021	0.021
Th (232)	<0.11	<0.022	<0.022	<0.022
U (234)	<0.05	0.038	0.038	0.038
U (238)	<0.05	<0.019	<0.019	<0.019
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	0.50			
As	0.050			
Ba	11.0			
B	3.7			
Cd	<0.003			
Cr	0.14			
Cu	<0.06			
Fe	0.025			
[illegible]	<0.07			
[illegible]	0.10			
Li	3.0			
Mn	0.018			
Mo	<0.10			
[illegible]	<0.010			
Ag	<0.11			
[illegible]	16.0			
[illegible]	<0.20			
[illegible]	1.3			
[illegible]	<0.015			
Sn	<1.0			
[illegible]	<0.015			
[illegible]	<0.5			
[illegible]	<0.040			
V	<0.3			
Sb	<0.080			
Zn	0.028			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: UTAH (BEAVER RIVER) HOT SPRINGS
LOCATION: COUNTY Weber & Box Elder TOWNSHIP 7 N RANGE 2W
SITE NO. 125 , PRIORITY NO. 7

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.5	6.5	6.5	6.5
Cond. (µmhos/cm)				
Temperature (°C)	54			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
[illegible] (%)				
NH_3 (µg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	182.0			
Na	9000			
K	920			
Ca	1200			
Mg	47			
SiO_2	34.5			
Cl	7400			
SO_4	59			
PO_4	0.0125			
TDS	23770			
[illegible]	280			
[illegible]	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	49±15	140	140	140
Rn (222)		1200	1200	1200
Th (230)	<0.34	0.16	0.16	0.16
Th (232)	<0.34	0.19	0.19	0.19
U (234)	<0.06	0.17	0.17	0.17
U (238)	<0.06	0.12	0.12	0.12
Pb (210)	<2.4±1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	8.8			
As	<0.025			
Ba	13.0			
B	4.8			
Cd	<0.003			
Cr	0.049			
Cu	<0.060			
Fe	0.097			
Cs	0.50			
Pb	0.16			
Li	6.7			
Mn	0.033			
Mo	<0.10			
Hg	<0.010			
Ag	0.088			
Sr	26.0			
Se	<0.20			
Rb	11.0			
Ni	<0.015			
Sn	<1.0			
Be	0.015			
Zr	<0.5			
Ti	0.63			
V	0.3			
Sb	<0.080			
Zn	0.025			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE UTAH
SITE NAME BAKER'S (ABRAHAM/CRATER) HOT SPRINGS
LOCATION - COUNTY Juab TOWNSHIP 14 S RANGE 8W
SITE NO. 127 , PRIORITY NO. 9

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.95	7.6	6.48	6.97
Cond. (μmhos/cm)				
Temperature (°C)	80	84	82	83
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)		21	21	21
O_2 (%)				
NH_3 (μg/m³)		84.6	84.6	84.6
CH_4 (mg/m³)		398	398	398
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	131.2			
Na	830	850	830	840
K	58	59	57	57
Ca	320	345	340	342
Mg	49	54	52	53
SiO_2	76	69	69	69
Cl	1780	1500	0	1000
SO_4	685	680	680	680
PO_4	0.08			
TDS	4045	3748	3692	3720
SS	2.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.8±0.5	1.5	1.5	1.5
Rn (222)		1700	1700	1700
Th (230)	<0.09	0.025	0.025	0.025
Th (232)	<0.09	<0.006	<0.006	0.006
U (234)	≤0.14	0.039	0.039	0.039
U (238)	≤.14	0.03	0.03	0.03
Pb (210)	<1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
Al	0.40	0.002	0.002	0.002
As	<0.025			
Ba	0.50			
B	1.4	0.86	0.80	0.83
Cd	<0.003			
Cr	0.033			
Cu	<0.060	0.03	0.01	0.02
Fe	0.040	0.26	<0.02	0.14
Ge	0.08	<0.1	<0.1	0.1
Pb	0.066			
Li	0.91	1.0	1.0	1.0
Mn	0.28	0.25	0.25	0.25
Mo	<0.10			
Hg	0.010	<0.0001	<0.0001	0.0001
Ag	<0.060			
Sr	4.5			
Se	<0.20			
Rb	0.29	0.26	0.24	0.25
Ni	<0.015	0.02	<0.02	0.02
Sn	<1.0			
Sb	<0.015			
Ti	<0.5			
Tl	0.062			
V	0.30			
W	<0.080			
Zn	0.041			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: WASATCH HOT SPRING
LOCATION - COUNTY: Salt Lake TOWNSHIP 1 N RANGE 1W
SITE NO. 129 , PRIORITY NO. 13

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.7	7.2	7.2	7.2
Cond. (μmhos/cm)				
Temperature (°C)	42	43	43	43
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	228.4			
Na	1500			
K	52			
Ca	390			
Mg	94			
SiO_2	92.5			
Cl	2430			
SO_4	930			
PO_4	0.0775			
TDS	6135			
SS	6.0			
S	0.34			
RADIOACTIVITY (in pCi/l)				
Ra (226)	16±5	27	27	27
Rn (222)		160	160	160
Th (230)	<0.10	0.024	0.024	0.024
Th (232)	<0.10	<0.013	<0.013	<0.013
U (234)	0.55±0.16	0.3	0.3	0.3
U (238)	0.31±0.12	0.16	0.16	0.16
Pb (210)	<1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	2.3			
As	0.030			
Ba	0.37			
B	1.4			
Cd	<0.003			
Cr	<0.030			
Cu	<0.060			
Fe	0.059			
Cs	<0.07			
Pb	0.068			
Li	0.66			
Mn	0.020			
Mo	<0.10			
Hg	0.010			
Ag	<0.060			
Sr	5.8			
Se	0.20			
Rb	0.30			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	0.080			
Zn	0.009			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: MONROE (COOPER) HOT SPRINGS
LOCATION - COUNTY Seiver TOWNSHIP 25S RANGE 3W
SITE NO. 130 . PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	7.0	6.2	6.67
Cond. (μmhos/cm)				
Temperature (°C)	56	70	46	60
Flow (l/min)		500	500	500
GAS ANALYSIS:				
H_2S (μg/m^3)	301			
CO (mg/m^3)	<116			
CO_2 (%)	33.4	57	57	57
O_2 (%)	10.0			
NH_3 (μg/m^3)	192	183	183	183
CH_4 (mg/m^3)	<66	198	198	198
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	378.1			
Na	550	600	530	570
K	56	52	52	52
Ca	270	300	295	298
Mg	35	38	36	37
SiO_2	41.0	59	59	59
Cl	630	650	0	423
SO_4	1040	900	880	890
PO_4	0.112			
TDS	2875	3004	2948	2976
SS	40.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	**3.2±1.0**	5.2	5.2	5.2
Rn (222)	**3.49***	250	250	250
Th (230)	**<0.10**	0.066	0.066	0.066
Th (232)	**<0.10**	0.051	0.051	0.051
U (234)	**0.18±0.11**	0.21	0.21	0.21
U (238)	**<0.16**	0.1	0.1	0.1
Pb (210)	**<1.0**			

* pCi/m^3

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (3)		
		MAX	MIN	MEAN
Al	9.0	0.002	0.002	0.002
As	0.12			
Ba	6.6			
B	3.6	3.0	2.9	3.0
Cd	<0.003			
Cr	0.030			
Cu	<0.060	0.01	<0.01	0.01
Fe	0.22	0.9	<0.02	0.46
Cs	0.10	0.1	<0.1	0.1
Pb	<0.030			
Li	0.60	0.64	0.63	0.64
Mn	0.12	0.11	0.09	0.10
Mo	<0.10			
Hg	<0.080	<0.0002	<0.0002	0.0002
Ag	<0.060			
Br	6.6			
Se	<0.20			
Rb	0.25	0.22	0.2	0.21
Ni	<0.015	<0.02	<0.02	0.02
Sn	<1.0			
Sr	<0.015			
Ti	<0.5			
Tl	<0.040			
V	0.30			
Sb	<0.080			
Zn	0.047			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: RED HILL HOT SPRINGS
LOCATION - COUNTY Sevier TOWNSHIP 25S RANGE 3W
SITE NO. 131 , PRIORITY NO. 6

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.6	6.45	6.25	6.35
Cond. (µmhos/cm)				
Temperature (°C)	72	77	76.5	76.75
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m³)	100			
CO (mg/m³)	<116			
CO_2 (%)	38.3			
O_2 (%)	10.0			
NH_3 (µg/m³)	3	296	296	296
CH_4 (mg/m³)	<66			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	342.9			
Na	570	590	590	590
K	62	60	60	60
Ca	260	290	290	290
Mg	32	34	34	34
SiO_2	56.5	58	58	58
Cl	640	660	660	660
SO_4	1000	890	890	890
PO_4	0.037			
TDS	3010	3019	3019	3019
SS	11.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	4.4±1.3	6.3	6.3	6.3
Rn (222)	.484*	750	750	750
Th (230)	<0.15	0.022	0.022	0.022
Th (232)	<0.11	<0.008	<0.008	<0.008
U (234)	≤0.17	<0.2	<0.2	0.2
U (238)	<0.06	<0.015	<0.015	0.015
Pb (210)	<2.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	1.1	0.005	0.005	0.005
As	<0.025			
Ba	1.3			
B	2.85	2.8	2.8	2.8
Cd	<0.003			
Cr	<0.030			
Cu	<0.060	0.01	0.01	0.01
Fe	0.11	0.86	0.86	0.86
Cs	0.13	0.1	0.1	0.1
Pb	<0.030			
Li	0.64	0.72	0.72	0.72
Mn	0.046	0.07	0.07	0.07
Mo	0.10			
Hg	<0.010	0.0002	0.0002	0.0002
Ag	<0.060			
Sr	0.88			
Se	<0.20			
Rb	0.29	0.26	0.26	0.26
Ni	<0.015	<0.02	<0.02	0.02
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	<0.040			
V	<0.30			
Sb	<0.080			
Zn	0.022			

* in pCi/m³

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: SARATOGA HOT SPRING
LOCATION - COUNTY: Utah TOWNSHIP 5S RANGE 1W
SITE NO. 132, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	6.95	6.95	6.95
Cond. (µmhos/cm)				
Temperature (°C)	42	41	41	41
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	269.1			
Na	210			
K	22			
Ca	180			
Mg	48			
SiO_2	180			
Cl	351			
SO_4	35			
PO_4	0.08			
TDS	1595			
F	0.6			
	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	11±3	18	18	18
Rn (222)		2600	2600	2600
Th (230)	<0.12	0.049	0.049	0.049
Th (232)	<0.12	<0.007	<0.009	0.009
U (234)	0.40±0.12	0.57	0.57	0.57
U (238)	0.36±0.11	0.4	0.4	0.4
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	1.70			
As	0.050			
Ba	0.27			
B	0.5			
Cd	<0.003			
Cr	<0.030			
Cu	<0.060			
Fe	<0.030			
Cs	0.05			
Pb	<0.030			
Li	0.43			
Mn	<0.010			
Mo	<0.10			
Hg	<0.010			
Ag	<0.060			
Sr	3.10			
Se	<0.20			
Rb	0.10			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	0.050			
V	<0.30			
Sb	<0.080			
Zn	0.038			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: MIDWAY HOT SPRINGS
LOCATION - COUNTY Wasatch TOWNSHIP 55 RANGE 1W
SITE NO. 133 . PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.2	6.65	6.65	6.65
Cond. (µmhos/cm)				
Temperature (°C)	43	35	35	35
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	591.0			
Na	150			
K	200			
Ca	330			
Mg	69			
SiO_2	23			
Cl	170			
SO_4	930			
PO_4	0.037			
TDS	3520			
SS	7.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	5.3±1.6	0.15	0.15	0.15
Rn (222)		260	260	260
Th (230)	<0.16	0.26	0.26	0.26
Th (232)	<0.09	0.2	0.2	0.2
U (234)	0.33±0.11	1.3	1.3	1.3
U (238)	0.30±0.10	0.68	0.68	0.68
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	21.0			
As	0.055			
Ba	10.0			
B	1.25			
Cd	<0.003			
Cr	<0.030			
Cu	<0.060			
Fe	0.036			
Cs	0.05			
Pb	0.65			
Li	0.43			
Mn	0.077			
Mo	<0.10			
Hg	<0.010			
Ag	<0.060			
Sr	17.0			
Se	<0.20			
Rb	0.14			
Ni	0.032			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
[illegible]	0.032			
[illegible]	0.30			
Sb	<0.080			
Zn	0.072			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: PAH TEMPE (LA VERKIN) HOT SPRINGS
LOCATION - COUNTY Washington TOWNSHIP 14S RANGE 13W
SITE NO. 134 . PRIORITY NO. 11

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.6	6.52	6.25	6.39
Cond. (μmhos/cm)				
Temperature (°C)	39	42	41.9	41.95
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m³)	903			
CO (mg/m³)	<116			
CO_2 (%)	44.4			
O_2 (%)	9.3			
NH_3 (μg/m³)	<7.05	35.25	35.25	35.25
CH_4 (mg/m³)	<66			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	1055.8	991.5	991.5	991.5
Na	2240	2290	2290	2290
K	180	216.2	216.2	216.2
Ca	600	759.5	759.5	759.5
Mg	130	146.7	146.7	146.7
SiO_2	36	32.3	32.3	32.3
Cl	3700	3362.7	3362.7	3362.7
SO_4	879	1687.8	1687.8	1687.8
PO_4	0.075	.08	.08	.08
TDS	10150	9740	9740	9740
SS	17.0			
S	3.94			
RADIOACTIVITY (in pCi/l)				
Ra (226)	21±6	47	47	47
Rn (222)	.436*	550	550	550
Th (230)	<0.12	0.021	0.021	0.021
Th (232)	<0.16	0.02	0.02	0.02
U (234)	≤0.49	0.39	0.39	0.39
U (238)	≤0.38	0.31	0.31	0.31
Pb (210)	<1.0			

* in pCi/m³

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	11.0	<1.0	<1.0	<1.0
As	<0.025	.15	.15	.15
Ba	13.0	1.73	1.73	1.73
B	5.5	2.30	2.30	2.30
Cd	<0.003			
Cr	<0.030			
Cu	<0.060	<.1	<.1	<.1
Fe	0.066	.16	.16	.16
Cs	0.13			
Pb	0.10			
Li	2.0	.31	.31	.31
Mn	<0.010			
Mo	<0.10			
Hg	<0.010	<.0002	<.0002	<.0002
Ag	<0.060	<.06	<.06	<.06
Sr	6.1	6.89	6.89	6.89
Se	<0.20	.187	.187	.187
Rb	0.56			
Ni	0.063			
Sn	<1.0			
Be	0.015			
[illegible]	<0.5			
[illegible]	0.38			
V	<0.30			
[illegible]	<0.080			
Zn	0.047			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: OGDEN HOT SPRINGS
LOCATION - COUNTY Weber TOWNSHIP 6 N RANGE 1W
SITE NO. 136, PRIORITY NO. ALT

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.2	7.23	7.23	7.23
Cond. (µmhos/cm)				
Temperature (°C)	5[illegible]	58	58	58
Flow (l/min)				
GAS ANALYSIS:				
H_2S (µg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (µg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	164.7			
Na	2500			
K	350			
Ca	320			
Mg	11			
SiO_2	46			
Cl	5400			
SO_4	79			
PO_4	0.225			
TDS	15060			
SS	4.0			
S	0			
RADIOACTIVITY (in pCi/l)				
Ra (226)	1.8±0.5	23	23	23
Rn (222)		2200	2200	2200
Th (230)	< 0.28	0.05	0.05	0.05
Th (232)	< 0.28	<.017	<.017	<.017
U (234)	0.38±0.13	0.096	0.096	0.096
U (238)	0.17±0.09	0.033	0.033	0.033
Pb (210)	<1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	1.2			
As	<0.025			
Ba	2.6			
B	3.85			
Cd	<0.003			
Cr	<0.030			
Cu	<0.060			
Fe	0.040			
Cs	0.35			
Pb	<0.030			
Li	4.2			
Mn	0.65			
Mo	<0.10			
Hg	<0.010			
Ag	<0.060			
Sr	5.7			
Se	<0.20			
Rb	3.9			
Ni	<0.015			
Sn	<1.0			
Be	<0.015			
Ti	<0.5			
Tl	0.084			
V	0.3			
Sb	<0.080			
Zn	0.047			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: UTAH
SITE NAME: JOSEPH HOT SPRINGS
LOCATION - COUNTY Seiver TOWNSHIP 25 S RANGE 4W
SITE NO. 178 . PRIORITY NO. 12

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	7.3	6.51	6.51	6.51
Cond. (μmhos/cm)				
Temperature (°C)	62	63	63	63
Flow (l/min)		<100	<100	<100
GAS ANALYSIS:				
H_2S (mg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (mg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	349.2			
Na	1400	1500	1450	1475
K	54	50	50	50
Ca	220	260	260	260
Mg	42	44	44	44
SiO_2	84.5	92	90	91
Cl	1820	1700	0	850
SO_4	1000	1200	1200	1200
PO_4	0.08			
TDS	5140	5230	5230	5230
SS	6.0			
[illegible]	2.95			
RADIOACTIVITY (in pCi/l)				
Ra (226)	18±5			
Rn (222)				
Th (230)	<0.11			
Th (232)	<0.11			
U (234)	0.28±0.11			
U (238)	0.25±0.11			
Pb (210)	<1.0			

	TRW DATA	HISTORICAL DATA (2)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	13.0	<.002	<.002	<.002
As	0.075			
Ba	3.8			
B	4.1	4.9	4.9	4.9
Cd	<0.003			
Cr	<0.030			
Cu	<0.060	.01	.01	.01
Fe	<0.030	.27	.27	.27
Cs	0.13	.1	.1	.1
Pb	0.036			
Li	1.69	1.9	1.9	1.9
Mn	0.17	.19	.19	.19
Mo	<0.10			
Hg	0.010	<.0001	<.0001	<.0001
Ag	0.060			
Sr	35.0			
Se	0.20			
Rb	0.26	.24	.24	.24
Ni	0.082	.02	.02	.02
Sb	<1.0			
Be	<0.015			
Ti	<0.5			
[illegible]	0.20			
[illegible]	<0.3			
[illegible]	0.080			
Zn	0.16			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: WASHINGTON
SITE NAME: BAKER HOT SPRINGS
LOCATION - COUNTY: WHATCOM TOWNSHIP 38 N RANGE 9E
SITE NO. 191, PRIORITY NO. 3

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	8.2	8.4	7.7	8.1
Cond. (μmhos/cm)		900	879	890
Temperature (°C)	37	40	37.8	38.8
Flow (l/min)		8	6	7
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
CO (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity, (mg/l as $CaCO_3$)	135.1	158	134	148
Na	145			
K	9.0	13	7.7	10.17
Ca	6.3	16.6	.8	6.8
Mg	0.23	.06	0	.03
SiO_2	114	140	≈ 1	78.33
Cl	121	146	108	122.7
SO_4	63	109	12	60.5
PO_4	0.55	< .1	< .1	< .1
TDS	595	574	574	574
SS	2.8			
S	13.6			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.15±0.04			
Rn (222)				
Th (230)	< 0.22			
Th (232)	< 0.22			
U (234)	2.2±0.9			
U (238)	2.2±0.9			
Pb (210)	< 1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	0.72			
As	0.01			
Ba	< 0.07	< .1	< .1	< .1
B	2.9	3	3	3
Cd	0.0004	< .002	< .002	< .002
Cr	0.083	< .04	< .04	< .04
Cu	0.008	< .0004	< .0004	< .0004
Fe	0.017	< .1	< .02	< .06
Cs	< 0.07			
Pb	< 0.015	< .02	< .02	< .02
Li	0.31	.8	.38	.526
Mn	0.014	< .01	< .01	< .01
Mo	< 0.02			
Hg	0.002	.0016	.0016	.0016
Au	0.001	< .004	< .004	< .004
Sr	0.15	.08	.08	.08
Se	0.63	< 1.0	< 1.0	< 1.0
Ag	0.08	.09	.09	.09
Ni	0.105	< .02	< .02	< .02
Sb	0.63	< .02	< .02	< .02
Sn	0.100	< .005	< .005	< .005
Tl	< 0.08			
Ti	< 0.03			
V	0.02			
[illegible]	0.03	< .2	< .2	< .2
Zn	0.124			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE WASHINGTON
SITE NAME OHANAPECOSH HOT SPRINGS
LOCATION - COUNTY LEWIS TOWNSHIP 14 N RANGE 10E
SITE NO. 194 , PRIORITY NO. 4

	TRW DATA	HISTORICAL DATA (3) MAX	MIN	MEAN
PHYSICAL MEASUREMENTS				
pH	8.3	7.9	7.0	7.53
Cond. (μmhos/cm)		4478	4478	4478
Temperature (°C)	49.4	48.9		45.0
Flow (l/min)		11.3	11.3	11.3
GAS ANALYSIS:				
H_2S (μg/m³)	N/A			
[illegible] (mg/m³)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m³)				
CH_4 (mg/m³)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	916.5	934	380	667
Na	800	961	914	943.3
K	40	553	50	52.06
Ca	63	85	64	75.3
Mg	5.0	7.5	4.9	5.8
SiO_2	106	89	≈1.5	56.8
Cl	930	915	867	883.6
SO_4	71	620	172	396
CO_3	0.5	2	2	2
TDS	2800	2670	2670	2670
B	14.0			
F	0.68			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.39±0.12			
Rn (222)				
Th (230)	≤0.14			
Th (232)	≤0.14			
U (234)	≤0.10			
U (238)	≤0.11			
Pb (210)	≤1.0			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (3) MAX	MIN	MEAN
Al	<0.02			
As	0.01	.018	.018	.018
Ba	<0.02	.25	.25	.25
B	[illegible]	8	8	8
Cd	0.0002	<.002	<.002	<.002
Cr	<0.003	<.04	<.04	<.04
Cu	0.008			
Fe	<0.005	.7	.7	.7
Co	0.08			
Pb	<0.015	<.02	<.02	<.02
Li	2.6	4.7	3.0	3.64
Mn	0.14	.11	.11	.11
Mo	<0.02			
Hg	0.002	.002	.002	.002
Ag	0.001	<.004	<.004	<.004
[illegible]	7.5	.82	.3	.56
Se	0.31	6.0	6.0	6.0
Rb	0.31	.57	.57	.57
Sb	0.325	<.02	<.02	<.02
Sn	0.42	<.2	<.2	<.2
[illegible]	0.100	<.005	<.005	<.005
[illegible]	0.058			
[illegible]	<0.03			
[illegible]	0.067			
[illegible]	0.022			
Zn	0.029			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: WASHINGTON
SITE NAME: OLYMPIC HOT SPRINGS
LOCATION - COUNTY Clallam TOWNSHIP 29 N RANGE 7W
SITE NO. 196. PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	9.8	7.5	6.0	7.2
Cond. (μmhos/cm)				
Temperature (°C)	31.11	48	26	41.27
Flow (l/min)		135	135	135
GAS ANALYSIS:				
H_2S (μg/m^3)	201			
CO (mg/m^3)	<166			
CO_2 (%)	0.46			
O_2 (%)	7.6			
NH_3 (μg/m^3)	7.05			
CH_4 (mg/m^3)	21,200			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	121.5			
Na	65	79	39	68.1
K	1.2	1.5	.7	1.2
Ca	1.3	3.6	1.4	1.9
Mg	< 0.07	0	0	0
SiO_2	63	120	<0.1	57.7
Cl	<0.1	.74	0	.47
SO_4	31			
PO_4	0.32			
TDS	300			
SS	2.8			
S	21.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.09±0.03			
Rn (222)	.595*			
Th (230)	<0.22			
Th (232)	<0.22			
U (234)	≤0.13			
U (238)	≤0.09			
Pb (210)	<2.2			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (4)		
		MAX	MIN	MEAN
Al	0.16			
As	<0.01			
Ba	0.157			
B	0.5			
Cd	0.0003			
Cr	0.003			
Cu	0.005			
Fe	0.015			
Cs	<0.07			
Pb	0.015			
Li	<0.05			
Mn	0.002			
Mo	<0.02			
Hg	0.006			
Ag	<0.001			
Sr	0.08			
Se	0.01			
Rb	<0.07			
Ni	0.198			
Sn	<0.07			
Be	<0.002			
Ti	0.045			
Tl	0.031			
[illegible]	0.07			
[illegible]	0.005			
Zn	0.202			

* pCi/m^3

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: WYOMING
SITE NAME HUCKLEBERRY HOT SPRINGS
LOCATION - COUNTY Teton TOWNSHIP 48 N RANGE 115
SITE NO. 198, PRIORITY NO. 1

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.8	7.1	7.1	7.1
Cond. (μmhos/cm)				
Temperature (°C)	54.44	71	71	71
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	N/A			
CO (mg/m^3)				
CO_2 (%)				
O_2 (%)				
NH_3 (μg/m^3)				
CH_4 (mg/m^3)				
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	154.1	372	372	372
Na	190	201	201	201
K	10	7.8	7.8	7.8
Ca	13	12	12	12
Mg	1.3			
SiO_2	147.5	124	124	124
Cl	112	102	102	102
SO_4	17	12	12	12
PO_4	0.04			
TDS	700			
SS	1.2			
S	0.51			
RADIOACTIVITY (in pCi/l)				
Ra (226)	0.72+0.22			
Rn (222)				
Th (230)	< 0.35			
Th (232)	<0.35			
U (234)	0.75±0.21			
U (238)	0.46±0.16			
Pb (210)	< 1.9			

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.02			
As	0.07			
Ba	<0.02			
B	1.0			
Cd	0.0003			
Cr	<0.003			
Cu	0.002			
Fe	0.017			
Cs	<0.07			
Pb	<0.015			
Li	0.69			
Mn	0.30			
Mo	<0.02			
Hg	0.005			
Ag	<0.001			
Sr	0.63			
Se	0.03			
Rb	0.08			
Ni	0.046			
Sn	0.84			
Be	0.553			
Ti	0.096			
Tl	<0.03			
V	0.067			
Sb	0.005			
Zn	0.011			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: WYOMING
SITE NAME: AUBURN HOT SPRINGS
LOCATION - COUNTY Lincoln TOWNSHIP 33 N RANGE 119W
SITE NO. 199, PRIORITY NO. 2

	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.6	8.2	8.2	8.2
Cond. (µmhos/cm)				
Temperature (°C)	57	16	16	16
Flow (l/min)		11	11	11
GAS ANALYSIS:				
H_2S (µg/m^3)	1203			
CO (mg/m^3)	<166			
CO_2 (%)	0.49			
O_2 (%)	10.5			
NH_3 (µg/m^3)	27			
CH_4 (mg/m^3)	<66.3			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	434.9			
Na	1250	1500	1500	1500
K	68	180	180	180
Ca	315	252	252	252
Mg	73			
SiO_2	38.5	110	110	110
Cl	1720	2000	2000	2000
SO_4	12	1430	1430	1430
PO_4	0.08			
TDS	5560			
SS	6.0			
S	13.09			
RADIOACTIVITY (in pCi/l)				
Ra (226)	17±5			
Rn (222)	.032*			
Th (230)	<0.33			
Th (232)	<0.33			
U (234)	<0.10			
U (238)	<0.13			
Pb (210)	<1.9			

* pCi/m^3

CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)	TRW DATA	HISTORICAL DATA (1)		
		MAX	MIN	MEAN
Al	<0.02			
As	1.76			
Ba	<0.02			
B	2.1			
Cd	0.0002			
Cr	0.022			
Cu	0.001			
Fe	0.040			
Cs	0.08			
Pb	0.02			
Li	1.3			
Mn	0.013			
Mo	<0.02			
Hg	0.004			
Ag	0.0008			
Sr	1.92			
Se	1.79			
Rb	0.51			
Ni	0.026			
Sn	2.5			
Be	0.009			
Ti	0.122			
Tl	0.1			
V	0.139			
Sb	0.010			
Zn	0.002			

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SUMMARY OF ANALYTICAL DATA FROM GEOTHERMAL MANIFESTATIONS

STATE: WYOMING
SITE NAME: THERMOPOLIS HOT SPRINGS
LOCATION - COUNTY Hot Springs TOWNSHIP 43 N RANGE 94W
SITE NO. 252, PRIORITY NO. 3

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
PHYSICAL MEASUREMENTS:				
pH	6.2			
Cond. (μmhos/cm)				
Temperature (°C)	54.4			
Flow (l/min)				
GAS ANALYSIS:				
H_2S (μg/m^3)	0.36			
[illegible] (mg/m^3)	116			
CO_2 (%)	39.4			
O_2 (%)	11.8			
NH_3 (μg/m^3)	6			
CH_4 (mg/m^3)	292.4			
CHEMICAL ANALYSIS (MAJOR CONSTITUENTS in mg/l)				
Alkalinity (mg/l as $CaCO_3$)	288.5			
Na	225			
K	38			
Ca	300			
Mg	70			
SiO_2	35.5			
Cl	400			
SO_4	17			
PO_4	0.06			
TDS	2250			
[illegible]	2.0			
[illegible]	< 0.1			
RADIOACTIVITY (in pCi/l)				
Ra (226)	9.5+2.8			
Rn (222)	.042*			
Th (230)	<0.50			
Th (232)	<0.35			
U (234)	≤0.19			
U (238)	≤0.23			
Pb (210)	1.8±1.2			

* pCi/m^3

	TRW DATA	HISTORICAL DATA (0)		
		MAX	MIN	MEAN
CHEMICAL ANALYSIS (TRACE CONSTITUENTS in mg/l)				
Al	<0.02			
As	0.02			
Ba	<0.02			
B	0.6			
Cd	0.003			
Cr	0.008			
Cu	0.002			
Fe	0.038			
Cs	<0.07			
Pb	0.02			
Li	0.70			
Mn	0.025			
Mo	<0.02			
Hg	0.001			
Ag	<0.001			
Sr	0.50			
Se	0.08			
Rb	0.21			
Sb	0.054			
Sn	1.25			
Be	0.033			
[illegible]	0.849			
Ti	<0.03			
V	0.033			
[illegible]	0.004			
Zn	0.021			

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Inconsistencies in the data presented in Appendix G may be attributed to the following:

1) approximately half of the inconsistencies correspond to cases where collected data was compared with only one historical data point. In this situation it is impossible to conclude if the TRW data point or historical data point is inaccurate. In other words, the historical data is just as likely to be inaccurate as is the collected data. In addition, both data points could accurately reflect source characteristics at the time of sampling.

2) TRW's analysis methodologies may differ from those used in developing historical data. Even if the same analysis methods were used, many factors could give differing results. Some of these are:
   - changes in site hydrology could significantly impact resource characteristics
   - sampling site differences
   - care in sample handling
   - length of time sample stored before analysis.

3) In general, utilization of atomic absorption (AA) analysis techniques are less sensitive to background interferences than some analytic techniques. However, AA analysis is susceptible to background interferences when analyzing for SiO_2, Al and Ba. This interference will tend to yield results higher than should be obtained. Ba is particularly susceptible to interference when analyzing solutions with high salt content.

4) Reliable SO_4 analysis methodologies do not exist for samples with high salt content. This became evident when I retraced the history of the SO_4 analysis. Initially, TRW completed this analysis utilizing EPA Method 8 (titration). Apparently, these results did not agree with historical data and a second round of analysis was undertaken using an indirect atomic absorption technique. Inconsistent results were also obtained from the second analysis. A third round of analysis was performed by AGRI Science utilizing a gravimetric technique (weighing of a precipitate) and these results are shown in our second draft report. I reviewed TRW data for the inconsistent SO_4 results and generally observed the following: whereas AGRI Science data is significantly lower than historical data for certain sites; TRW data is significantly higher than historical data for these same sites. This further substantiates the claim that reliable SO_4 analysis methodologies for geothermal water do not exist.

5) Accuracy of the analysis methodology must be considered when evaluating inconsistencies between collected and historical data. For example, the accuracy of analyzing SO_4 with the indirect atomic absorption technique is ± 20 percent, as shown in Table 4 of the report. A sample containing 50 mg/l of SO_4 could be analyzed as containing

from 40 to 60 mg/l and be within the acceptable accuracy of the analysis technique. Therefore, in the SO_4 example, a ratio of data variance could be 1.5, solely as a result of analysis methodology accuracy. Factors mentioned in paragraph (2) above may cause increased variances between collected and historical data in addition to variances resulting from analysis accuracy.

APPENDIX G

TRACE METAL ANALYSIS OF ALGAE SAMPLES

EPA Form 2350-4 (4-80)
(PREVIOUSLY T.M. EPA FORM 297)

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TRACE METALS ANALYSES OF ALGAE SAMPLES (ppm by weight)

Site Name	NV Hot Hole	NV Darrough	NV Lockes H.S.	UT Stinking H.S.	UT Wasatch H.S.	NV Golconda	NV Sou H.S.	NV Wards H.S.	NV Walley's H.S.	NV Double H.S.	NV Bowers H.S.	NV Leach H.S.	NV Baltazor H.S.	OR Mickey H.S.	OR Vale H.S.	NV Baltazor H.S.
Site No.	73	233	247	124	129	77	239	174	71	236	256	79	186	180	182	186-B
Weight / Element	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3455	1.0	0.9374	1.3954	1.0634	1.0560
Sn	2	< 1	< 1	370	7	2	< 1	2	<1	<1	<3	5	<1	<1	<1	<1
Ag	43.0	110	80	140	1,300	170	130	210	230	220	1700	510	150	360	2.80	1500
Tl	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.7	0.65	<1	<0.18	<0.24	<0.24
Ti	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<7	<3	<3	<2	<3	<3
Pb	44	180	10	150	410	50	<10	20	60	30	100	50	40	30	20	100
Cd	0.49	0.80	0.70	0.40	2.3	0.60	0.30	0.35	0.85	0.80	2.5	1.9	0.80	0.54	0.71	0.90
Mo	<0.10	0.55	0.40	0.35	2.6	0.50	0.50	0.15	0.75	0.40	0.72	0.20	0.80	0.39	0.10	0.43
Zn	33	65	33	27	166	26	29	18	41	59	150	150	47	5	54	74
Cu	543	11.5	5.0	6.0	168	5.5	5.0	5.5	22.0	22.5	209	53	13.3	30.1	26.8	188
Ni	6	2.6	19	1.0	11	4	4.5	5.0	1.0	11	16	10	5	18	18	32
Co	0.7	3	0.20	0.15	4	0.10	3	<0.03	5	8	0.29	4	3	8	10	10
Fe	700	6,000	500	2,600	19,400	23,400	35,000	1500	9800	17800	4600	1600	8700	15200	22400	20600
V	1	16	1	1	9	6	5	3	7	50	7	9	9	150	28	39
Cr	12	37	29	32	38	37	16	8	10	40	48	23	17	23	25	40
Al	100	3,400	300	900	2,100	2,500	800	300	3200	1200	900	4600	5000	4300	7000	7600
Ba	50	38	20	45	83	100	33	20	37	59	40	75	97	66	157	104
Sr	1,100	200	350	250	160	110	7,900	130	70	190	90	1400	260	300	90	400
Ca	2,000	7,600	62,000	8,500	17,000	11,000	68,000	4100	5500	26900	9800	66000	23200	13400	18500	9800
Mg	11,000	3,700	7,100	5,200	3,400	3,800	6,200	7900	4000	6500	2200	8200	4100	6700	8800	9800
Be	310	27	8	4	29	93	161	25	<4	23	<4	94	20	24	9	16
Cs	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<150	<50	<50	<40	<50	<50
Rb	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<30	<10	<10	<7	<10	<10
Li	8	41	13	21	20	18	15	7	18	38	<14	137	66	50	65	110
K	600	2,900	2,300	3,700	2,900	2,200	1,100	1100	2900	3600	4400	3100	3200	3000	3000	3700
Na	1,030	3,740	1,590	27,700	5,400	1,090	1,025	2075	645	2770	2860	4520	7930	7060	1900	5080
Mn	50	170	10	30	40	390	140	160	130	360	190	1200	370	260	1100	410
Hg	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<7	<3	<3	<2	<3	<3
Sb	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	<0.5	<0.5	<0.4	<0.5	<0.5
Se	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<7	<3	<3	<2	<3	<3
As	10	50	50	50	100	100	800	10	50	30	140	10	10	40	20	30

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	NV	NV	NV	NV	ID	ID	ID	ID	ID	ID	ID	ID	ID	WY	WY	WY
Site Name	Kyle H.S.	Moana H.S.	Needle Rocks Spring	Needle Rocks Well	Roystone H.S.	Starkey H.S.	White Licks H.S.	Murphy H.S.	Bruneau Grandview	Condie H.S.	Boise Thermal	Boiling Springs	Maple Grove H.S.	Thermopolis H.S.	Auburn H.S.	Huckleberry H.S.
Site No.	210	241	248	248-B	226	167	230	220	162	61	171	221	223	252	199	198
Weight / Element	1.0419	0.3210	1.0620	1.0596	1.0521	1.0459	1.0345	1.0	1.0	1.0	0.8362	1.0	1.0	1.0	1.0	1.0
Sn	3	<3	<1	<1	<1	12	<1	<1	<1	<1	<1	<1	5	<1	3	6
Ag	390	16500	250	140	110	570	360	120	270	130	550	770	200	2700	200	110
Tl	7.2	<0.80	<0.24	<0.24	<0.24	<0.24	<0.24	<0.25	<0.25	<0.25	<0.30	<0.25	<0.25	2.2	<0.25	<0.25
Ti	<3	<10	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Pb	120	190	50	60	90	150	60	60	90	50	170	80	30	90	90	20
Cd	3.0	2.0	0.94	0.66	0.90	1.15	0.43	0.75	1.05	0.70	1.35	1.35	0.55	1.35	0.35	4.7
Mo	0.43	0.47	0.23	0.24	0.29	0.14	0.24	<0.10	<0.10	0.20	0.18	<0.10	<0.10	0.30	0.15	0.30
Zn	157	45	45	31	51	154	63	83	71	25	50	99	31	159	6	70
Cu	36.9	1460	27.7	11.8	9.0	68	38.7	9.5	29.5	5.0	68	100	8.5	493	3.0	6.0
Ni	7	22	20	8	8	30	10	2.9	33	2.1	6	1.6	5	19	0.5	1.2
Co	0.38	0.47	7	3	4	18	12	4	15	0.03	0.06	0.05	2	4	0.15	<0.03
Fe	7500	8800	15300	7700	14500	71000	36000	20800	28000	31700	1100	5800	9900	43000	800	3700
V	8	8	120	43	52	330	450	7	62	4	1	6	6	5	3	3
Cr	29	67	50	32	41	95	30	19	57	18	32	10	11	125	11	13
Al	4050	1230	6600	4500	2900	9300	5100	[illegible]000	8800	600	200	3100	500	1300	300	1300
Ba	170	159	90	130	100	63	38	69	63	30	11	38	50	110	22	100
Sr	280	130	470	670	230	140	200	10	50	520	10	110	50	260	260	250
Ca	8300	18900	48000	63000	17700	10400	9900	5600	12300	7300	3300	3200	2600	66000	3500	67000
Mg	8800	340	8400	8800	4400	5400	4100	1400	12000	12100	900	1300	1000	3900	3200	2400
Be	270	<15	10	<5	61	9	22	26	9	34	<4	7	98	5	38	48
Cs	<50	<150	<50	<50	<50	<50	<50	<50	<50	<50	<60	<50	<50	<50	<50	<50
Rb	<10	<30	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Li	111	<16	43	23	29	34	28	46	22	10	<6	22	13	8	6	27
K	270	4800	2800	2600	2600	2600	1900	2100	3300	1500	3800	2100	1200	1400	1000	1200
Na	1900	4020	4130	4930	3450	1420	3880	1190	1910	1700	2420	1200	1020	580	3920	2810
Mn	200	1300	440	190	1700	370	330	500	240	50	50	320	1000	100	200	1300
Hg	<3	<10	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Sb	<0.5	<1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Se	<3	<10	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
As	50	40	20	90	50	50	120	50	20	250	250	20	350	10	150	50

	MT	MT	ID	WA	WA	CA	CA	CA	CA	OR	CA	CA	CA	CA	AZ	AZ
Site Name	Jardine H.S.	Barkel's Silver Star H.S.	Squaw H.S.	Olympic H.S.	Ohanapecosh H.S.	Wandel H.S.	Leonard's H.S.	Surprise Valley	Fales H.S.	Barry's Ranch	Casa Diablo	Morgan H.S.	Magma-East Mesa	Warner H.S.	Gillard H.S.	Mt. Graham H.S.
Site No.	208	206	165	196	194	32	39	40	41	121	143	145	254	153	7	5
Weight / Element	1.0	1.0	1.0	1.0	1.0	0.6373	0.8041	0.1931	0.7040	0.2667	0.2676	0.5537	0.7396	0.0159	1.0	0.2165
Sn	<1	<1	4	2	<1	<2	<1	<5	5	<5	<4	4	2	<60	2	<5
Ag	110	330	160	470	70	280	100	890	210	770	300	110	330	4000	230	15000
Tl	<0.25	<0.25	<0.25	<0.25	<0.25	<0.39	<0.31	<1.3	<0.36	<0.94	<0.94	<0.45	<0.35	<16	<0.25	<1.0
Ti	<3	<3	<3	<3	<3	<4	<3	<5	<4	<10	<10	<6	<4	<160	<3	<10
Pb	40	70	20	30	20	30	<10	<25	<7	230	40	10	141	3400	70	230
Cd	0.65	1.50	0.25	0.65	0.65	2.9	0.99	3.7	0.99	2.1	2.1	0.54	0.95	41	0.65	2.7
Mo	<0.10	0.15	0.15	<0.10	<0.10	<0.20	<0.15	<0.50	<0.15	<0.40	<0.40	<0.20	0.61	6.2	0.30	0.69
Zn	61	115	6	85	56	95	64	39	123	156	41	23	49	1600	40	270
Cu	7.5	20.5	3.5	34.5	6.0	16.4	22.4	15.5	19.9	48	7.3	5.4	16	3.8	16.8	2500
Ni	0.9	19	0.5	30	5	8	22	21	14	51	1.3	38	177	300	21	12
Co	<0.03	6	<0.03	10	<0.03	0.08	7	0.13	4	0.18	0.37	0.09	9.5	16	6	0.50
Fe	6600	12600	3300	29600	2500	4200	15200	5200	52000	187000	4900	84000	8650	40900	8800	14400
V	5	13	12	60	4	<1	124	4	8	27	2	37	48	<31	2	<2
Cr	11	63	11	61	6	6	32	13	13	210	15	28	149	1200	32	100
Al	2000	4600	100	8000	600	1500	6800	1800	3200	12600	7700	700	1500	9700	3200	1800
Ba	150	43	210	148	13	27	101	60	148	120	159	25	64	850	94	155
Sr	1800	660	7900	200	40	50	120	120	530	2900	500	20	126	1200	173	490
Ca	60000	55000	7400	6900	6400	7400	10600	13100	30300	240000	37100	1800	16300	59700	25500	14800
Mg	5200	11100	5800	9500	500	2900	6200	2300	3600	6700	1600	1100	47300	21000	3800	2400
Be	54	27	46	6	10	8	6	26	565	1060	84	9	51	1900	25	55
Cs	<50	<50	<50	<50	<50	<80	<60	<250	<70	<200	<200	<90	<70	<3000	<50	<200
Rb	<10	<10	<10	<10	<10	<15	<10	<50	<15	<40	<400	<20	<15	<600	<10	<40
Li	14	70	31	94	<5	30	22	<26	23	104	108	31	12	<31	18	23
K	2000	3000	3100	2700	800	2900	4000	4400	2500	7100	6000	5100	2300	31700	1700	2000
Na	3320	2260	67000	940	850	3830	3930	12000	3760	22000	13000	5480	1450	24500	2350	26100
Mn	1200	1600	400	330	60	100	370	110	220	790	440	30	160	1000	280	480
Hg	<3	<3	<3	<3	<3	<4	<3	<5	<4	<10	<10	<6	<4	<160	<3	<10
Sb	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	<0.6	<1.0	<0.7	<2	<2	<1.0	<1	<30	<0.5	<2
Se	<3	<3	<3	<3	<3	<4	<3	<5	<4	<10	<10	<6	<4	<160	<3	<10
As	40	10	30	30	20	30	20	70	7800	13000	100	64000	30	2600	20	600

	AZ	NM	NM	NM	CO	CO	CO	CO	CO	CO	UT	UT	UT	UT	CO
Site Name	Indian H.S.	Faywood H.S.	Gila H.S.	Yucca Bath & Lodge	Waunita H.S.	Cottonwood H.S.	Wagon Wheel	Idaho H.S.	Mineral H.S.	Steamboat Springs	Red Hill H.S.	Pah Tempe H.S.	Midway H.S.	Utah H.S.	Glenwood H.S.
Site No.	2	93	94	251	54	45	55	176	60	58	131	134	133	125	52
Weight Element	0.3208	0.9875	0.0807	0.5636	0.4741	0.1738	1.0	0.0075	1.0	0.1763	1.0	0.8323	0.2121	1.0	0.0798
Sn	4	<1	12	<11	<2	<6	14	<130	<1	<6	2	<1	<5	<1	<10
Ag	940	260	480	880	280	430	310	3400	210	980	170	250	260	160	540
Tl	<0.8	<0.25	<12	<0.44	<0.50	<1.5	<0.25	<33	<0.25	<1.4	<0.25	<0.30	<1.2	8.0	<3
Ti	<8	<3	<30	<4	<5	<15	<3	<300	<3	<15	<3	<3	<10	<3	<30
Pb	200	240	550	570	190	350	130	6200	70	340	30	70	220	40	540
Cd	2.9	0.71	11	6.8	7.1	4.0	0.50	230	0.70	7.9	0.55	0.90	3.1	0.10	11
Mo	3.1	1.2	1.9	3.1	0.84	0.86	0.35	13	0.30	1.4	0.20	0.30	3.1	5.0	3.8
Zn	92	56	81	280	160	100	58	5200	105	96	14	49	71	22	88
Cu	45	27.3	43.4	113	31.6	37.4	72	130	17.5	116	5.5	31.8	18.9	8.5	31
Ni	22	24	6	8	46	26	4	47	12	30	28	20	2	<0.3	<15
Co	0.50	2	2	6	7	17	0.2	3	4	<1.5	0.2	5	0.5	0.05	0.6
Fe	5450	66000	3720	6400	15300	17300	8200	33300	10,800	7,100	34,400	3,200	17,400	275,000	6.900
V	<2	8	<6	1	2	3	<0.5	<60	20	8	0.5	25	<2	<0.5	<6
Cr	150	28	220	42	40	81	21	1100	27	100	19	53	110	12	220
Al	1600	1350	500	2100	5300	7000	1600	3300	3,300	1,900	1,000	1,900	600	100	400
Ba	380	260	68	94	93	101	590	1270	400	74	110	50	170	130	81
Sr	430	250	1200	420	180	230	160	1100	570	270	530	190	1,100	730	300
Ca	83000	58000	101000	54600	11600	51500	3800	70700	68,000	22,700	2,500	21,300	119,000	53,000	30,000
Mg	4100	2800	2000	2900	5500	10700	7700	8000	7,200	2,600	3,900	7,000	3,800	350	2,400
Be	37	91	93	26	47	58	213	1100	45	45	103	14	64	1,500	81
Cs	<150	<50	<600	<80	<100	<300	<50	<6000	<50	<300	<50	<60	<200	<50	<600
Rb	<30	<10	<100	<15	<20	<60	<10	<1000	<10	<60	<10	<15	<40	<10	<150
Li	41	12	<6	12	31	29	21	<670	13	28	15	11	23	23	63
K	4300	1400	4100	2500	4000	4800	1400	17300	2,800	3,600	800	2,400	5,100	2,400	9,600
Na	16300	610	5950	3630	2820	1320	1980	10600	695	5,450	845	8,630	2,360	3,500	11,600
Mn	140	420	70	140	340	390	1500	130	160	120	250	70	110	1,200	40
Hg	<8	<3	<30	<4	<5	<15	<3	<300	<3	<15	<3	<3	<10	<3	<30
Sb	<1.5	<0.5	<6	<1.0	<1.0	<3	<0.5	<60	<0.5	<3	<0.5	<0.6	<2	<0.5	<6
Se	<8	<3	<30	<4	<5	<15	<3	<300	<3	<15	<3	<3	<10	<3	<30
As	50	150	240	5000	20	40	50	2300	30	40	1500	30	1900	1600	140

Site Name	UT Joseph H.S.	UT Baker's H.S.	UT Ogden H.S.	CO Routt H.S.	CO Sulfur H.S.	UT Thermo H.S.	UT Crystal H.S.	NV Dixie H.S.	NV Trego
Site No.	178	127	136	57	53	122	123	237	257
Weight / Element	1.0	1.0	0.0093	0.5173	0.3628	1.0	0.0665	1.0	1.0
Sn	<1	2	<100	26	4	2	<15	<1	<1
Ag	160	< 140	610	160	100	140	690	450	<240
Tl	0.75	0.5	< 27	< 0.5	< 0.70	< 0.25	<4.0	<0.25	<0.25
Tl	< 3	< 3	<250	< 6	< 7	< 3	<40	<3	<3
Pb	30	20	5,700	140	120	70	750	20	60
Cd	0.30	0.30	70	1.4	1.9	< 0.40	9.8	0.75	1.4
Mo	0.35	0.20	10	0.39	<0.30	<0.10	< 1.5	0.20	0.15
Zn	33	12	380	47	28	9	120	66	71
Cu	6.5	7.0	10.7	13.5	6.9	2.5	60	36.5	24.0
Ni	12	11	100	12	12	0.5	13	20	9
Co	0.05	0.3	15	5	0.55	0.25	6.0	13	5
Fe	20,100	17,300	11,700	10,400	2,300	1,700	13,500	25,400	12,300
V	< 0.5	< 0.5	<50	<1	<1	2	8	190	33
Cr	15	13	1,350	69	52	26	225	31	25
Al	1,600	1,100	2,100	7,700	600	900	3,300	10,400	6,500
Ba	420	250	530	49	91	130	90	<5	<5
Sr	90	350	1,200	300	45	1,400	220	220	570
Ca	3,700	4,600	135,000	24,000	1,300	[illegible],100	44,000	30,900	58,000
Mg	5,300	11,000	9,100	2,980	800	5,800	12,200	19,500	840
Be	153	56	500	73	18	230	90	13	25
Cs	< 50	< 50	<5,000	<100	<100	< 50	<750	<50	<50
Rb	< 10	< 10	<1,000	< 20	< 20	< 10	<150	<10	<10
Li	14	25	<500	38	1	22	< 75	154	56
K	900	1,300	11,300	3,700	2,600	1,400	9,500	4,100	3,600
Na	3,600	2,750	8,600	5,060	3,730	1,350	31,600	4,640	3,730
Mn	800	1,700	810	700	380	10	80	490	270
Hg	< 3	< 3	<250	< 6	< 7	< 3	<40	<3	<3
Sb	< 0.5	< 0.5	< 50	< 1.0	< 1.0	< 0.5	< 7	<0.5	<0.5
Se	< 3	< 3	<250	< 6	< 6	< 3	<40	<3	<3
As	1900	100	1100	130	20	50	270	50	60

GLOSSARY OF SYMBOLS

Ag - Silver
Al - Aluminum
As - Arsenic
B - Boron
Ba - Barium
$Ba(ClO_4)_2$ - Barium perchlorate
Be - Beryllium
Bi - Bismuth
Ca - Calcium
Cd - Cadmium
CH_4 - Methane
Cl - Chlorine
CO - Carbon Monoxide
CO_2 - Carbon Dioxide
Co - Cobalt
Cr - Chromium
Cs - Cesium
Cu - Copper
F - Fluorine
Fe - Iron
HCI - Hydrochloric Acid
Hg - Mercury
HNO - Hypo-Nitrous acid
HNO_3 - Nitric Acid
H_2S - Hydrogen sulfide
H_2SO_4 - Sulfuric acid
K - Potassium
KCI - Potassium chloride

Li - Lithium
Mg - Magnesium
Mn - Manganese
Mo - Molybdenum
Na - Sodium
NH_3 - Ammonia
Ni - Nickel
O_2 - Oxygen
Pb - Lead
PO_4 - Phosphate ion
Rb - Rubidium
Sb - Antimony
Se - Selenium
SiO_2 - Silicon Dioxide
Sn - Tin
SO_3 - Sulfite
SO_4 - Sulfate
Sr - Strontium
SS - Suspended Solids
TDS - Total Dissolved Solids
Ti - Titanium
Tl - Tallium
V - Vanadium
Zn - Zinc

EPA Form 2350-4 (4-80)
(PREVIOUSLY CIN. EPA FORM 287)
TYPING GUIDE SHEET